THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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NEW SERIES
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A PLEA FOR TRADE EDUCATION.

INTERESTING DESCRIPTION OF THE DEVELOPMENT OF MANUAL TRAINING.

BY ROBERT DULK.*

"The high schools and academies, the colleges and universities, the advanced technical schools, and the professional schools, which are either public or exact only a low fee and offer many scholarships, are more than adequate to the training of all the 'professionals' thing goes on indefinitely the country must be the poorer by it."—Andrew S. Draper, Commissioner of Education of the State of New York.

In the foregoing paragraph Dr. Draper has sounded the keynote. Too long a man who uses his hands in

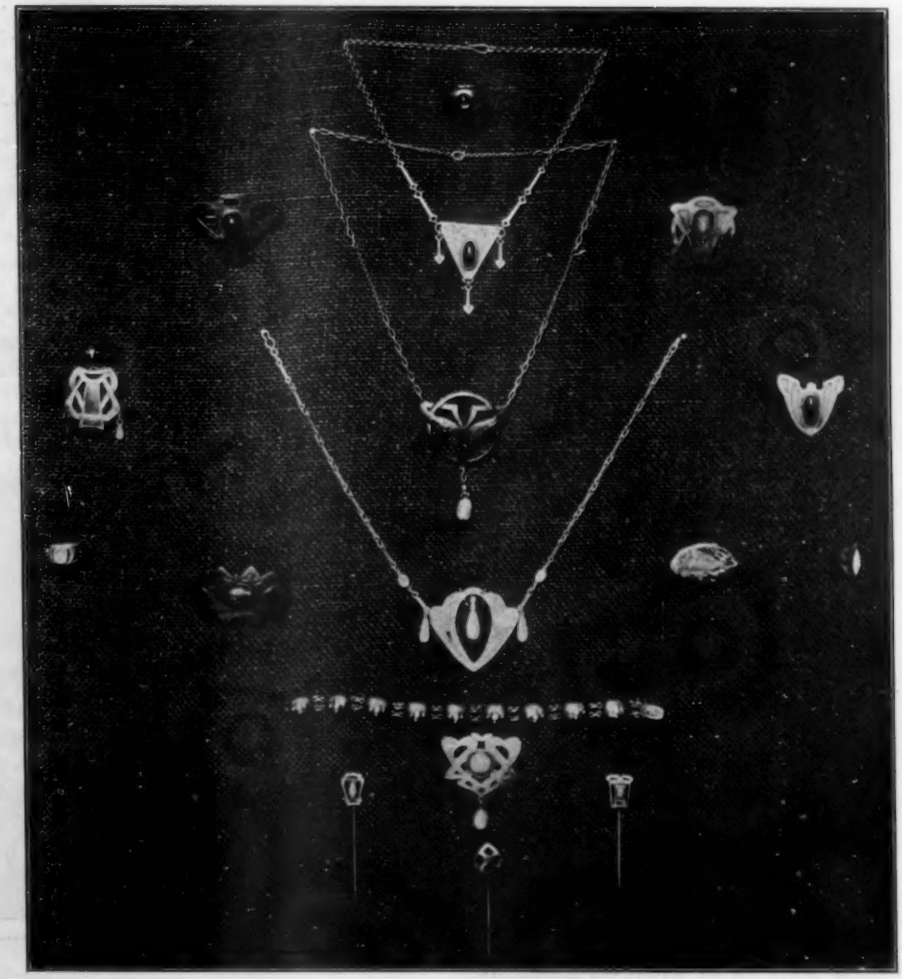


FIG. 1. EXAMPLES OF CHAIN MAKING, STONE SETTING, ENAMELING, CHASING AND ETCHING.

or 'intellectuals' that the country can use. Indeed, they are so overstocking the professions with misfits, and turning youth from craftsmanship, that if the labor was considered not on par with the man who used his head. A false pride has misled us, but progressive education now realizes that the Perfect Man will be the one who may dictate with an evenly developed brain to hands that can execute.

* Professor New York Evening High School for Men.

Notwithstanding our boasted broadness of educational opportunity, modern conditions have opened a large gap in the educational system, which denies the just rights of the wage-earning masses and thus wrongfully menaces the industrial efficiency and the material prosperity of our country.

EARLY TRAINING WITHOUT PRACTICAL EXPERIENCE.

The elementary school trains for no industrial employment, it leads to nothing but the high school, which in turn prepares the youth for college and thus to professional occupations. The boy who graduates from the elementary school is not only unprepared for any vocation which will be open to him, but frequently he is without that intellectual training which should make him eager for opportunity and spur him on to utmost effort. Unfortunately, but nevertheless true, he goes without respect for the manual industries, where he might find work if he could do it. In short, he is without the simple preparation necessary to begin work in an office or a shop. And who, having to deal with the employing of apprentices, has not had this experience?

OPPORTUNITIES OFFERED FOR INDUSTRIAL EFFICIENCY.

Pupils are thus urged by precept and example to eagerly crowd into fields of employment that engage

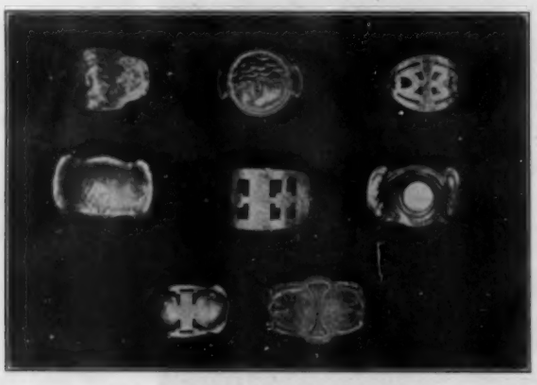


FIG. 2. BELT BUCKLE EFFECTS.

perhaps not more than 10 per cent. of our population and at all costs to avoid the occupations which command the services of the other 90 per cent. Too long we have educated for the professions, too long the recruits for our industrial army have received comparatively little of the time or money expended on our public school.

It has been found that agricultural education not only increases the value of the farm products and enhances the profits of the farm, but raises the agricultural calling to a higher plane and makes the life of the farmer better worth living. Industrial education would have a similar effect upon the industrial life of the nation. It would make the mechanic work more intelligently, more hopefully, with more ambition and a better prospect of improving his condition. Industrial education, as Dr. Draper wisely says, does not mean that we must give over the work which goes to literary accomplishment, or art sense, or refined manners, or professional equipment, or scientific learning of whatever kind. It does mean that the equilibrium between the intellectuals and industrials is being lost and must be restored. It does mean that our pupils are being misdirected into misfits, and that it must cease.

Prompted by conditions such as the foregoing, the writer five years ago suggested and executed a radical change in the free hand drawing department of the New York Evening High School for Men. Mere formal training was to give way to practical work, self activity to reign supreme, and with special reference to the metal industry.

In this connection the writer sought the advice of Mr. Louis C. Tiffany, of Tiffany & Co., New York.

FIG. 3. LOUIS C. TIFFANY MEDAL.

That public-spirited gentleman whose reputation as an artist and a craftsman is world wide, quickly saw the benefits of a course of study where the young man, without expense to himself, either for tools or material, might be trained in the use of his hands to carry out the ideas his mind had conceived. So thoroughly in accord was Mr. Tiffany with such a practical undertaking that he offered then and there two medals for annual competition, one of gold and another of bronze, and known as the Louis C. Tiffany medal for the advancement of arts and crafts. These medals are awarded by a jury to the two students having the best showing at the end of the term. Several models for these medals were designed by the class; the successful design is herewith reproduced (Fig. 3).

DEVELOPMENT OF THE WORK.

The work of this course has passed the experimental stage; its utilitarian purpose has been recognized. Here in a beautiful and modern school building costing the City of New York a million and a half dollars, a large, airy workshop has been in-

FIG. 4. LAMP SHADE DESIGNS.

stalled with an equipment capable of carrying on the practical work from modeling, saw-piercing, chasing, etching, hammering, stone setting, hard and soft soldering, etc., to enameling.

In connection with the workshop is the designing room, where the student is surrounded by illustrations of the best examples of the work done in this field;

these are drawn upon for inspiration and suggestions. Here, under the guidance of the instructor, a practical designer and craftsman recruited from the commercial field, the designs for the various problems are created. When the designs have been completed the class goes to the workshop, where the student gets his practical knowledge; he fashions in either wax, copper, brass or silver that which he has planned in the designing room.

Illustration No. 2 shows a collection of eight belt buckles embracing the various modes of treatment, namely, pierced, chased, etched and enameled.

Illustration No. 1 is a display of a number of pieces of jewelry calling for problems in chain making, stone setting, piercing, enameling, chasing and etching. The metals used are copper and silver, while the stones in some of the pieces were cut from the rough and polished by the students.

Illustration No. 4 represents some of the larger work carried on at the school; to the left is a portable electric lamp in pierced brass, octagonal in shape, with four bulbs, the student having taken the sun as a motive for his design. Each panel has nine different pieces of glass in its construction. The piece to the right is a hexagonal electrolier, having the scarab and lotus decoration; it measures 22 inches in diameter, and is also in pierced brass. While these illustrations do not represent the extent of the work carried on in this school, enough has been shown to give an idea of the usefulness of its purpose.

The New York Evening High School for Men is the only institution where work of this nature is offered free, and not only this, but all work made by the student becomes his personal property at the end of the term. The school is located at 59th street and 10th avenue, New York City, and will open for the fall and winter term on Sept. 27, 1909. Two weeks prior to this date is given over to registration of pupils.

THE CHEMIST'S RELATION TO THE COPPER AND BRASS INDUSTRY.*

By Ernest A. Lewis.

(Continued from August.)

ANALYSIS OF COPPER.

Antimony is also conveniently estimated by distillation. The method is described fully by Gibb (Journal of the Society of Chemical Industry, 1901, page 184). It is best to make a separate distillation for arsenic. The precipitate of iron carbonate containing the arsenic and antimony is dissolved in hydrochloric acid as described by Gibb, the solution evaporated to incipient dryness, after about 0.25 grm. of pure copper is added to reduce arsenic and antimony, hydrochloric acid is added and the solution distilled again (there is no need of a thermometer); the arsenic is completely removed. Zinc chloride solution is added and the antimony distillate separately collected. It is necessary to add 3 additions of 5 c.c. each of fuming hydrochloric acid and to remove all the antimony, and the solution must consist practically of fused zinc chloride. For tough coppers 5 grms. are sufficient, for "Best Select" 10 grms., and electrolytic 20 grms.

The electrolytic method gives good results, the antimony and arsenic being precipitated together with iron as basic carbonate, as in the distillation method. The precipitate is dissolved in 5 c. c. of dilute hydrochloric acid and the solution diluted to 100 c.c., treated with hydrogen sulphide, and filtered through a hardened paper, the precipitate being well washed with hydrogen sulphide solution. The antimony and arsenic are dissolved out by passing 10 c.c. of warm sodium sulphide solution several times through the filter, and the solution diluted to 50 c.c., and electrolysed after adding 5 c.c. of hydrogen peroxide solution. It is best to use electrodes of platinum foil about 2 in. by 1 in. The antimony is deposited in from 6 to 8 hours, it can be identified by the usual tests. Owing to the purity of commercial copper nowadays antimony is seldom present except in traces.

TIN.

Tin is seldom found in copper. If a slight white precipitate forms on dissolving 10 or 20 grms. in nitric acid free from chlorine, the solution is diluted to about 500 c.c., and allowed to stand for 48 hours, after decanting the top liquid, the solution is diluted and digested with 5 grms. of tartaric acid for 4 hours on the hot plate; if the precipitate does not dissolve, it consists of tin and can be filtered off and weighed.

Phosphorus does not occur in refined copper except in minute traces. The method of estimation depends upon the kind of copper. Many manufactured coppers, such as tubes, rods, etc., contain phosphorus. If arsenic is not present 10 grms. are dissolved in nitric acid, and the phosphorus precipitated with ammonium molybdate, and then converted into magnesium phosphate in the usual way. When arsenic is present it must be removed by means of hydrogen sulphide, and the phosphorus estimated in the filtrate.

Sulphur occurs in refined copper in traces only. 10 grms. are dissolved in nitric acid, the solution is diluted, 2 or 3 drops of hydrochloric acid added, let stand overnight to remove any silver, filtered through two ashless papers, evaporated twice to dryness with hydrochloric acid, and precipitated with barium chloride. In Chili bar copper 2 grms. are sufficient.

IRON AND NICKEL.

Iron and nickel are estimated by dissolving 10 grms. in 35 c.c. of nitric acid and 35 c.c. of water, boiling off acid fumes, diluting, and electrolysing. If the electric current can be obtained from a main supply, most of the copper can be precipitated after adding 10 c.c. of sulphuric acid, the remainder being precipitated with hydrogen sulphide. The solution is evaporated to dryness, adding 2 c.c. of nitric acid towards the end. The iron is precipitated with ammonia, and the filtrate electrolysed after adding 1 grm. of ammonium oxalate. If hydrogen sulphide has to be used to separate the copper, the solution is diluted to 1½ litres and hydrogen sulphide passed through it for 2 hours. The precipitate is filtered through several filters, previously washed with hydrochloric acid and distilled water to remove iron. The filtrate is boiled to dryness, adding 2 c.c. each of nitric and sulphuric acids towards the end. The iron and nickel are separated as above. It is not necessary to separate cobalt.

OXYGEN.

Several processes by reduction in hydrogen have been proposed for this estimation. Archbutt's method is simple and very accurate. The process is described

*From a paper read at Birmingham meeting of the Society of Chemical Industry.

in detail in the Analyst (25, p. 253). The analysis of mattes and similar material can be carried out similar to pure copper, using 5 or 10 grms. according to its purity.

ANALYSES OF SPELTER.

The only impurities present in sufficient quantity in modern spelter to concern a metallurgist are tin, lead, copper, and iron, very rarely cadmium, and in some spelters aluminum. There is usually a difference in price of 10*s.* and £1 a ton between distilled spelter and remelted spelters. Very often remelted spelter is of better quality than some distilled spelters, and it is sold as distilled spelter. It is often possible to say whether a spelter is distilled or remelted from the analysis. If copper is detected the spelter is almost certainly remelted. If from 0.2 per cent. to 0.5 per cent. of tin is present as well as copper there is no doubt the spelter is remelted. Nearly all remelted spelters contain over 0.1 per cent. iron. It is said that aluminum is put in remelted spelter to brighten it; but I have never come across any. The effect of cadmium is to cause the spelter to have a fine grained fracture, quite different to ordinary spelter. For lead, tin, copper, and iron, 20 grms. are dissolved in 40 c.c. of sulphuric acid and 240 c.c. of water. If the action is too vigorous, it must be modified by cooling. When the zinc is nearly dissolved the solution is filtered and the precipitate well washed. Iron is determined in the filtrate by titration with permanganate of potassium. The precipitate is washed into a beaker, 15 c.c. of nitric acid added, and the whole boiled, diluted to 100 c.c.; if a precipitate of stannic oxide is present, it is filtered off, the filtrate evaporated until copious acid fumes are evolved after adding 10 c.c. of sulphuric acid, diluted with water, allowed to stand 3 hours or better overnight, and the lead sulphate filtered off and washed with dilute sulphuric acid in the usual way: the filtrate can be electrolysed for the remainder of the lead and the copper. This solution frequently contains some of the iron, which can be precipitated with ammonia.

Aluminum, if present, goes into solution with the bulk of the iron; it must be determined on a separate 20 grm. lot.

CADMIUM.

Cadmium is estimated on a separate 20 grm. lot; part of it dissolves with the iron and can be precipitated by passing a slow current of hydrogen sulphide for at least 2 hours. The portion left with the lead is precipitated by hydrogen sulphide after separating lead as sulphate and any copper by electrolysis. The cadmium is weighed as sulphide on dried filter papers.

In high grade spelters containing 99.8 per cent. of zinc, upwards, the only metals present are lead and iron. It is best to work on 40 grms. At present there is no sufficient accurate electrolytic method of estimating zinc direct in spelter—it is always found by difference. Any method of sampling zinc by rubbing it to powder in a hot ladle is valueless. Several plates must be drilled through in several places to get a good sample.

The complete analysis of lead, tin, and antimony is not required in a copper works, the commercial metals being sufficiently pure. The analysis of aluminum presents no special difficulty. 10 grms. should be taken for the estimation of silicon, copper, and iron. No other metal is present as a rule. The aluminum is calculated by difference.

NICKEL.

In the case of cube nickel, a large number of cubes should be broken up, and 10 or 20 grms. dissolved in 80—160 c.c. nitric acid, the solution is evaporated to dryness, after adding 200 c.c. of hydrochloric acid, heated on the air bath for ½ hour, treated with 20 c.c. of hydrochloric acid and water, and the silica filtered off. The filtrate is received into a 1,000 c.c. flask; an aliquot part, equal to 1 grm. of nickel, is treated with hydrogen sulphide to remove copper, evaporated to dryness, and 1 c.c. of nitric acid added to oxidize iron, which is precipitated by ammonia as usual. The filtrate is received into a porcelain dish, dilute sulphuric acid added till the free ammonia is neutralized, then a further 5 c.c. of sulphuric acid in excess; it is now evaporated until sulphuric acid begins to volatilize, when water is added, then ammonia in excess and 1 grm. of ammonium oxalate, and the solution electrolysed at 60° C. A separate portion (equal to 5 grms.) of the 1,000 c.c. is used for determining copper and iron.

Carbon is usually present in cube nickel, but is not required to be determined for the German silver trades. If necessary, the carbon, which is present in the free state, can be estimated by combustion.

Sulphur is estimated on a separate portion of the 1,000 c.c. by precipitation as barium sulphate.

ANALYSES OF ALLOYS.

Alloys can be devided into several classes, such as various brasses, gun metals, manganese bronzes, aluminium bronzes, white metals, and the miscellaneous alloys.

In the analysis of brass copper and zinc are determined on 1 grm. by electrolysis as decribed for copper, but only 2 c.c. of sulphuric acid is added. The zinc is determined either electrolytically or the ferrocyanide method. From a large experience of the volumetric ferrocyanide method I believe it to be far more accurate than usually supposed, provided it is carried out under standard conditions. The solution containing the zinc is evaporated to about 100 c.c., ammonia is added in excess, and the solution just heated to boiling and filtered into a 9-inch basin, with hot water containing a little ammonia; the solution is made just acid with hydrochloric acid, a further 2 c.c. are added, and the solution is diluted to about 700 c.c. and heated to boiling. The ferrocyanide solution (1 c.c.=0.01 grm. zinc) is added, 2 or 3 c.c. at a time with continuous stirring, to within 3 or 4 c.c. of the end, the solution is again boiled, 1 c.c. of a saturated solution of uranium acetate is added, and the ferrocyanide added a drop at a time, until the solution is faintly brown. The end reaction is very sharp. If a trace of copper is present the end reaction is best obtained with spots of uranium acetate on a white tile in the usual way. The ferrocyanide is standardized against pure electrolytic zinc. The assay is accurate to within .05 per cent., working on 1 grm. of brass.

The determination of traces of tin, lead, and iron is done on 5 or 10 grms. by dissolving in nitric acid to separate tin, evaporating with 20 c.c. of sulphuric acid till copious fumes are evolved, taking up with water and filtering off the lead sulphate after standing overnight; the iron is precipitated with ammonia as usual. This method is sufficiently accurate for commercial purposes, but for exact work the small amount of lead in solution must be separated by electrolysis, and added to the main percentage. An exact analysis requires the separation of the small amount of nickel, which is often present. About 7 grms. are dissolved in nitric acid and the copper separated by hydrogen sulphide or by electrolysis; the solution is evaporated to dryness and the zinc separated as sulphide in an acetic acid solution, as described under German silver.

(To be continued.)

THE PATENT CONTROVERSY OVER BEARING METALS.*

CONTINUATION OF THIS INTERESTING DISCUSSION.

BY ANDREW ALLAN, JR.†

My attention has been called to Mr. G. H. Clamer's paper, on page 284 of the August issue of THE METAL INDUSTRY, replying to my paper published in the July issue, to which I wish to reply. We will again go into the history of these alloys. In 1891 Andrew Allan, Sr., placed on the market various alloys of Allan metal. From 1891 to 1895 very little was known of these alloys outside of New York City and vicinity. From 1895 to 1898 Allan metal sales rapidly grew and a business was developed from a local one of inter-State magnitude, our products finding their way to the markets of Philadelphia, Pittsburg, Chicago, Boston, Milwaukee, St. Louis, St. Paul, etc. Now, from 1891 to 1898, with the exception of Allan metals, there was not a copper-lead alloy on the market, either with or without tin, that would hold up over 15 per cent. lead without the use of nickel. Since 1898 some twelve firms have placed on the market such alloys. Strange indeed, this rapid growth in inventive activity that has been brought forth after the valuable merits of Allan metals became generally known.

Mr. Clamer criticises my action in publishing my paper in the technical press as hardly being a befitting place in which to discuss a grievance, such as I apparently am laboring under. I appreciate Mr. Clamer's position in regretting my procedure. The very existence of the technical press is based on the distribution of knowledge for the advancement of the profession to which said press is devoted. Their success as technical journals depends upon the character of their articles, the ability of their editors to discriminate between articles of scientific interest to their subscribers, articles whose purpose is for the advancement of the art, and those articles which are presented in the form of scientific information, but which in reality are only prompted by a desire to obtain free publicity. I am not using the columns of the technical press in this discussion for publicity work to promote the sales of our products. My motives in entering this controversy are wholly prompted by the best interest of the profession and not for mercenary purposes. My object is not to form a comparison of merit between the products of the Ajax Metal Company and A. Allan & Son. I am not entering on a discussion of the merits of any particular formula. I have no desire to comment for or against the merits of plastic bronze, but wholly to discuss this art, who was its inventor, who holds claim to the art of producing a class of alloys which shall hold up within themselves more lead than was hertofore possible without the use of nickel.

Mr. Clamer states: "But to come to Mr. Allan's real grievance, he seems to be desirous of proclaiming himself the real and true inventor of a class of alloys to which plastic bronze belongs." My paper of July was published for two reasons:

1st—My intention to prove that Andrew Allan, Sr., was the real and true inventor of the class of alloys to which plastic bronze belongs.

2d—To give evidence to the public in support of said claims. To show why, in my opinion, the Ajax Metal Company is not entitled to patent rights on alloys that will hold up more lead than was heretofore possible without the use of nickel. To produce evidence contradicting his claims of having discovered the critical point as to the percentage of tin that can be added to a copper-lead mix.

Mr. Clamer states: "The above difference in composition between Allan's metal and plastic bronze, *i. e.*, Allan's metal consisting of copper and lead only, whereas plastic bronze consists of copper and lead with tin in a substitutional amount, puts these alloys in an entirely different class so far as uses are concerned." Mr. Clamer is correct in his claim that our alloy of 50 per cent. lead and 50 per cent. copper and plastic bronze are in an entirely different class so far as uses are concerned. But only so far as uses are concerned, they both belong to the same class of alloys that hold up more lead than was heretofore possible without the use of nickel; or, in other words, alloys that are composed of over 15 per cent. lead, less than 7 per cent. tin, balance copper.

Mr. Clamer states: "No claims whatever have been at any time made by us to a copper and lead alloy without a hardening constituent."

We would like to call attention to page 17 in the Ajax Metal Company's catalogue, which does not support his present claim. "For upward of twenty-five years it has been known that copper, tin and lead alloys made the most successful bronze bearing metal. Previous to this, copper and tin, or gun metal, had been used. Lead, it was found, gave the alloy a certain yielding or plastic nature, so essential to good bearing metal. Later, by experiments made on P. R. R. under direction of Dr. Dudley, their chemist, it was found, to use the doctor's own words: '1st—The loss of metal by wear, under exactly same conditions, diminishes with increase of lead. 2d—The loss of metal by wear, under exactly same conditions, diminishes with diminution of tin.'

It was further found that the capacity for heating was likewise greatly reduced under the same conditions. Naturally, *endeavors were made to make an alloy containing as much lead and as little tin as possible.* The limit was found to be copper 78, tin 7, and lead 15. *Alloys with less tin and more lead exhibited segregation.* The above valuable knowledge led us to experiment and endeavor to produce an alloy with lower tin and higher lead contents. This we are proud to say we have accomplished. *By means of a process invented and patented in 1900, we are enabled to alloy copper and lead in any proportions, either with or without tin.*"

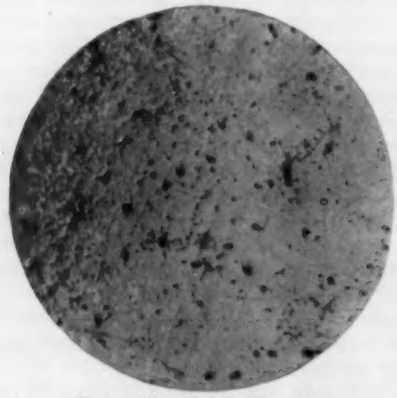
We call special attention to the last two paragraphs on page 17. Do they not prove that this art is based on producing alloys that will hold up more lead than was hertofore possible without the use of nickel? An art invented by Andrew Allan, Sr., in 1876. The lead, not the tin, is the critical element. How to control the lead. Mr. Clamer states: "We have long been perfectly familiar with the fact that lead and copper, when melted together and poured into castings can be held in fairly uniform mixture in a casting even of considerable size." We would hardly draw such a conclusion from the last two paragraphs on page 17, in their catalogue.

Mr. Clamer states: "The difficulty which we overcame, was not alloying lead and copper alone, but alloying lead and copper in the presence of tin." I will not comment on this; but will refer to page 17, in their catalogue. Mr. Clamer states: "Tin when present in too great an amount in proportion to the copper will segregate the lead if present in amount somewhat exceeding 20 per cent." I will prove later that Mr. Clamer is mistaken.

* Began in July Number American Edition.

† Of A. Allan & Son, manufacturers of Allan Metal.

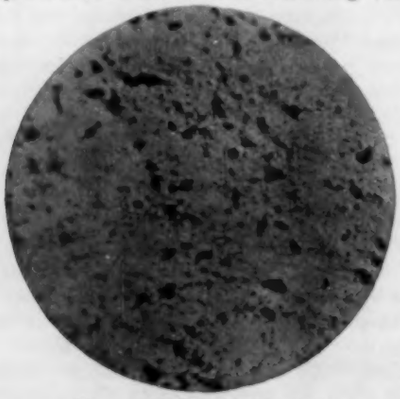
Photo-micrographs shown in connection with Mr. Clamer's paper, we do not recognize as any of our products, and any conclusions based on same cannot reasonably be considered. With reference to Mr. Clamer's statement that the lead in a lead-copper or lead-copper-tin mixture does not lower the freezing point of copper (1976 deg. Fahr.), from my experience is not correct. Lead does lower the freezing point of copper considerably.



No. 1. Magnified 65 Diameters.

We have no retractions to make for the article on page 12, in our No. 1 Bulletin, to which Mr. Clamer calls attention. Every claim made therein is true for the class of trade for which said Bulletin was intended.

Mr. Clamer states: "It is curious to note that after decrying the use of tin in a bearing metal because of its adhesive qualities, he makes the following statement in

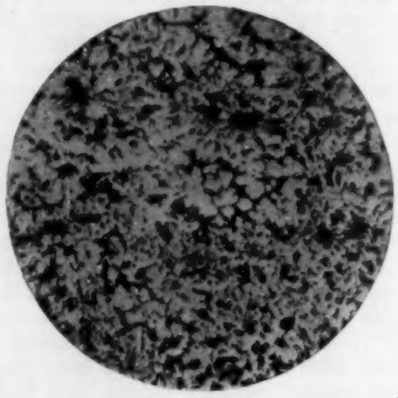


No. 2. Magnified 65 Diameters.

pronouncing the virtues of his metal: 'Being plastic and malleable, these lead and copper alloys possess all the virtues of genuine babbitt as anti-friction metal, and we have consequently classed them under the general denomination of babbitt metal.'" We feel that we have every reason to be proud of our No. 1 Bulletin and that it is fully capable of withstanding any criticism, if it is only read properly. We present the paragraph following the one Mr. Clamer draws attention to and which he omitted:

"Notwithstanding the fact we have classed Allan metal as a babbitt, it is evident from its different composition that its properties must be considerably divergent from those of white babbitt. Not only do the wearing and anti-friction qualities excel by far those of white babbitt, but its freezing point is about equal to that of bronze. This property, never found in so soft a metal, establishes for it a third class of bearing metals, that of 3 deg. soft metals with a high freezing point, of which Allan metal is so far the unique representative."

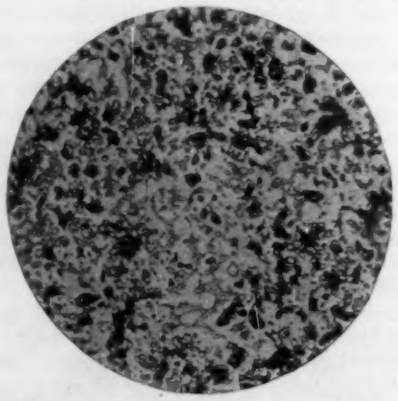
I will now take up for consideration Reissued Letters Patent No. 12880, and with a series of photo-micrographs prove that Mr. Clamer has not established the critical point, that the art is not based on the tin, but how to control the lead. 1st—From Reissued Letters Patent No. 12880 we read: "This critical point is a well demonstrated



No. 1a. Magnified 65 Diameters. Compression at yielding point, 19,000 pounds per square inch. Strain per square inch, 68,200 pounds.

scientific fact, which is generally, if not universally, accepted; and exists close to where there are nine parts of tin to ninety-one of copper, or relatively something over nine per cent. of the former."

We call attention to photo-micrograph No. 1, unetched,



No. 2a. Magnified 65 Diameters. Compression at yielding point, 21,000 pounds per square inch. Strain per square inch, 61,000 pounds.

and No. 1-a, etched, a specimen of a mixture of 63 per cent. copper, 27½ per cent. lead, 9½ per cent. tin, or approximately 15 parts tin to 85 parts copper in the mix. Do these photo-micrographs not prove our claim, that by the Allan process our mixtures are homogeneous and actually like one metal? Do they not prove that the critical point is not 9 parts tin to 91 parts copper in the mix?

2d—"The invention therefore consists not in the establishment of exact and rigid proportions, but in the discovery of the application of the critical relation between tin and copper required to make possible high percentage of lead." We call attention to photo-micrograph No. 2, unetched; and No. 2-a, etched, a specimen of a mixture of 58 per cent. copper, 32 per cent. lead, 10 per cent. tin; or approximately 17 parts tin to 83 parts copper in the mix. Does this not prove that the application of a critical relation between tin and copper, required to make possible high percentage of lead, has not been established?

3d—"In the described improvements we have discovered that a much higher percentage of lead which is desirable, can be added to such alloys containing less than seven per cent. of tin, than can be added to such alloys containing more than seven per cent. of tin." We beg to differ with Mr. Clamer on this point. In concluding, I wish to impress upon my readers that my motives in this discussion are prompted without malice, that my statements are honestly made and their truth based upon grounds which we believe reasonable. My comments are intended to be fair, as relating to the question under discussion.

DUTIES AND TRIALS OF SUPERINTENDENT OF A FLATWARE MANUFACTURING PLANT.

By C. W. Cooke.

C. W. COOKE.

The writer has for many years been identified as superintendent in the manufacture of tableware, such as spoons, forks, knives, etc., called flatware, and has learned many essential points in regard to the business. The first requisite is honesty of purpose—honesty to the company and also with the men. A man in a position of this character must study the interests of his company in every possible way he can. He must be faithful, diligent, ambitious, and be on call at all times; must have quick and accurate judgment, and follow all goods in manufacture from start to finish, keep the quality of the product up to the standard requirements, and at the same time produce the good at as low cost to the company as possible. The superintendent must be thoroughly acquainted with all the machines and tools at his command, and be always on the watch for later and better methods of producing the goods. The writer believes a man in this position should be thoroughly interested in his work and should strive to manufacture the product as good or better in quality and at as low price as competitors in the same line of goods. And no matter how young or old a man may be, he is either gaining or losing in usefulness, and whenever he ceases to have a reserve force, no matter what the demands may be, he deteriorates and his usefulness becomes a thing of the past so far as being able to produce best results.

The condition and equipment of flat ware plants are varied, and the pleasures and annoyances are governed in a large degree by this fact more than any other. The producing of goods in a well-equipped plant and under favorable conditions is a pleasure to the man who is thoroughly interested in his work, but it is impossible to have all these just as we would like. The first principle in this business, as well as others, is to produce goods at a profit to the ones who furnish the capital to carry on the work.

The annoyances and trials are many and varied in character. The great trouble in our business is procuring first-class mechanics, men who will work for the good of the company and accomplish a fair day's work, and do it well. Conditions have changed in the past twenty years in this respect. There seems to be a lethargy and lack of ambition in nearly all factory employees to-day as compared with the years gone by. There is a lack of interest in getting out goods, both in quality and quantity. Nowadays the men are more anxious for the time to pass than to try to turn out a fair day's work. This all makes a handicap for the superintendent and company in producing goods.

When rush orders come in, which happens every day, it is very annoying to have men inclined to hold back rather than make a little effort to get out the goods, the superintendent is held responsible for it all, and he has to make every possible effort in getting orders filled on time. He should know his business and be thoroughly acquainted with the calibre of his men. He must keep in touch with the tools and work from the beginning of manufacture to the finish of product. In every plant there are many things which retard the work. Tools will break, and many times when the orders are most pressing sickness of men or in their families makes it necessary for them to be absent from their work.

When this occurs it takes a link from the chain, and then the superintendent must provide a way to keep the goods coming. Sometimes the man absent is one not on the most skilled work; it is then possible to place another man on his work and it goes along without much trouble. But often the man or men do special work, some part of which they alone are thoroughly familiar with and by long experience the work comes easy, but the man is absent and the work must be done. The superintendent must either place the best man at his disposal on the job or jump in himself, if he can, in order to get the work finished.

Many men in this position are unable to jump in and make a success of special work, even though they have been superintendent for many years. The writer has been very fortunate, or sometimes he thinks very unfortunate, in being able to get his experience by doing every operation on flat ware, so whatever knowledge he has in the business has come to him by hard knocks and many years' experience of the practical points of the work. A few years ago our company had a rush order to be gotten out at once. The man who did the drop work on the bowls was taken ill and had to go home.

There was no one else available, so the writer made an attempt to finish the job. This was Friday afternoon, and there were just 13 gross left to finish. All went well until they were nearly finished, when something happened. I have never been able to figure out just how it occurred; maybe it was because it was Friday, or that there were just 13 gross in the lot; most likely because I was careless. Anyway, three fingers of my right hand are shorter than before. But the order was filled on time, and though my short fingers will always be a reminder, I have learned to use them very well. There was a great satisfaction in filling this particular order on time, in spite of the digital loss.

It is next to impossible for the superintendent on this line to sit in his office and direct his men from that point alone. He must get around among his foremen and the men and try to help them in every way he can to keep the goods coming through. Sometimes, I have learned a few words of encouragement helps wonderfully in getting good results; often a kind word will be better than a reprimand and produces more and better work. In my early life experience it was almost impossible to have patience, but as the years have gone by and I have come to a larger and fuller experience, I have found that there is much gained by having a large supply of patience even under the most trying circumstances, rather than making everyone uneasy by a loss of temper.

THE DEVELOPMENT OF MELTING FURNACES.

A Description of the Earliest and Latest Types.

By L. J. Krom.

(Continued from August.)

In cut No. 4 we present an illustration of an installment of pit furnaces manufactured by The Rockwell Furnace Company, 26 Cortlandt street, New York.

This type of furnace can be operated by coal, coke, gas, or oil with natural or forced draft. As will be seen from the cut, when it is desired to substitute gas or oil for coal or coke, all that is necessary is to close up the grate space at the bottom. These furnaces are of the brick lined type, and can be used singly, set simply on the floor or in battery set below, giving an ash-pit opening at the bottom.

The combustion chambers are as small as consistent with good construction, and insure complete combustion, resulting in high efficiency with minimum consumption of fuel.

The cover arrangement, thickness, style of lining and other details, as well as the construction below the floor level can be made to meet local conditions.

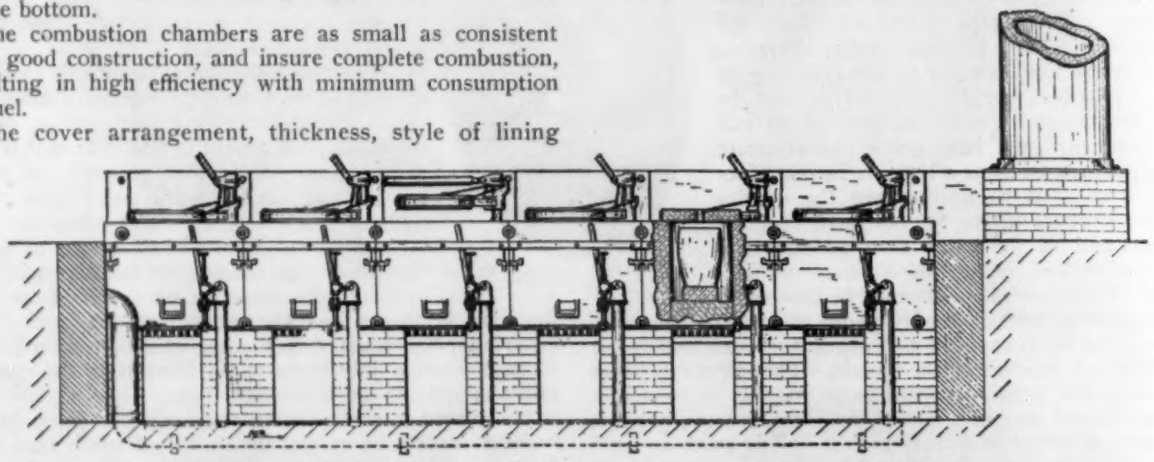


FIG. 4. BATTERY OF PIT FURNACES. ROCKWELL FURNACE COMPANY.

In cut, Fig. 5, is shown an end view of one of these furnaces which gives in plain detail the arrangement of the burners and the hoist for lifting the crucible from the fire.

Another type of pit furnace is the Class N. Calorex Crucible melting furnace, manufactured by the W. N. Best American Calorific Company, New York. We show cut (Fig. 6) of this furnace, which is run with oil, and of the burner (Fig 7). The secret of the high efficiency of this furnace is the burner.

Some of the claims made for this furnace are:

First—Increase in output from 50 to 300 per cent.
Second—Reduced labor cost.
Third—Elimination of dirt from coal and ashes.
Fourth—No stand-by losses when furnace is idle.
Fifth—Less time required to get furnace up to heat.
Sixth—Instantaneous response to regulation of burner.
Seventh—Less oxidation of metal.
Eighth—Longer life of brickwork and reduced cost of furnace repairs.

These furnaces can be used singly or set in batteries of as many as are desired, and bricked in to hold the heat, and are claimed, as above, to be very efficient. Fig. 8 shows a battery of these furnaces, which are so arranged as to provide for a preheating chamber, which greatly accelerates the rate of melting.

The manufacturer says of these furnaces:

"Each of the Class N direct fired furnaces is equipped with a hydro-carbon burner of improved type, which is capable of thoroughly atomizing any gravity of liquid fuel (either oil or tar), and is also provided with a combustion chamber so placed that the flame is tangential. By means of this combustion chamber of proportions adequate for the perfect combustion of the atomized fuel, and the tangential flame, the heat is so evenly distributed that the bottom of the crucible is as hot as the other part.

"The lower furnaces are each vented by a flue of sufficient size to remove all the consumed and inert gases. These vent flues connect with the pre-heating chamber above, so that the waste gases heat the charge of metal in these upper crucibles to about 800 or 1,000 degrees, which, of course, is a great saving in fuel. If desired, the waste heat from the indirect fired furnaces or pre-heating chamber can be used in the drying of cores, the

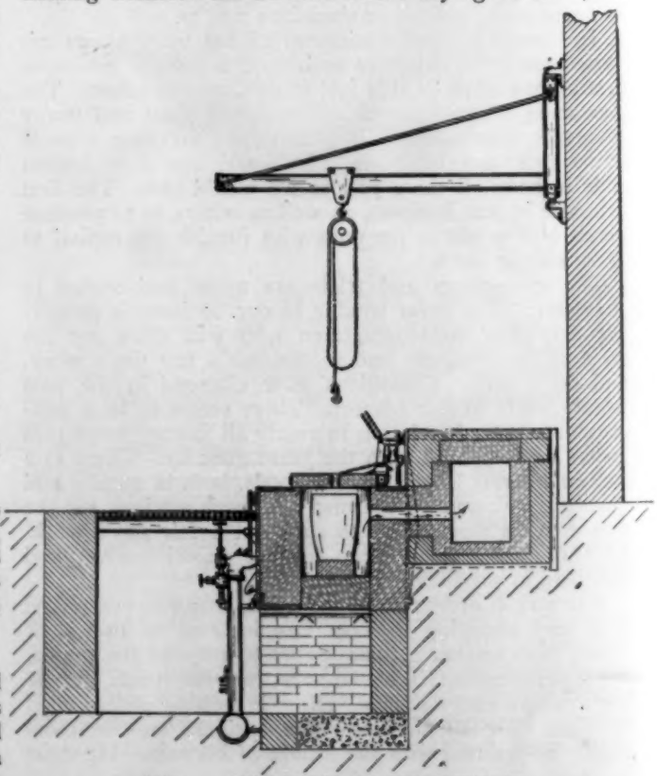


FIG. 5. END VIEW OF PIT FURNACE.

quantity of heat used for this purpose being controlled by a damper. The direct-fired furnaces are provided with slag openings so that in case of the breaking of a crucible the metal will flow down into the pit, from which it can be easily removed when it again becomes solidified.

"The operation of this battery of furnaces is very simple. In the morning all the furnaces (both direct and indirect) are charged at the same time, and when the first

FIG. 6. CLASS "N" "CALOREX" CRUCIBLE MELTING FURNACE.
Lined with 6 ins. fire brick and used for melting brass, copper, etc. Equipped with a combustion chamber arranged to form a tangential flame in furnace, thus insuring an even distribution of the heat.

"With liquid fuel any desired heat can speedily be attained, and therefore with these furnaces and combustion chambers and burners of this type, the question is not how much metal can be heated, but how much is desired. In other words, the quantity of metal that can be melted is only limited by the endurance of the men handling the metal or operating the furnaces. The operator of the furnaces has the heat under perfect control, and by merely increasing or decreasing the fuel supply, the metal may be heated as rapidly or as slowly as desired without fear of oxidation. Some foundrymen do not desire to heat the metal so quickly, and in this case a lighter fire is maintained in the furnaces. Each of the indirect-fired furnaces is equipped with a hydro-carbon burner, so

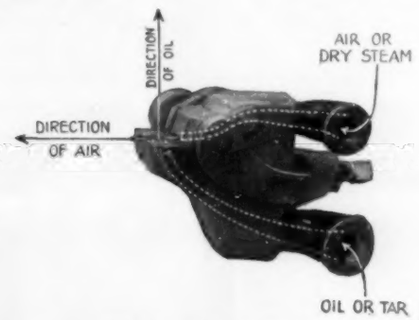


FIG. 7. THE BURNER.
This is a patent burner which atomizes the fuel outside of the burner, by means of a high-pressure current of air acting at right angles to the flow of oil and mechanically distributing the atomized fuel.

charge in a direct-fired crucible is poured, the melter removes a crucible from the indirect-fired row, which has by this time been pre-heated, to take the place of the crucible that has just been poured, and then he recharges the indirect-fired furnace with a new charge of metal. Using this method of pre-heating, melting ordinary brass in No. 70 crucibles, a crucible can easily be taken from a direct-fired furnace every 40 minutes. In melting of special alloys, such as 75 per cent. nickel and 25 per cent. copper, where higher heats are required, using this method a crucible of the same size can be heated in about 70 minutes.

that in emergency cases when a greater quantity of metal must be heated, these burners may be used in conjunction with the heat passing from below.

"The loss of metal in this battery of furnaces is no greater than when using coal or coke as fuel, while the economies are very marked, for, besides the output being greatly increased, there is no time wasted in waiting upon heats, in the handling of the fuel nor in the sifting and disposal of the ashes.

"The Calorex hydro-carbon burner used on these furnaces externally atomizes the fuel. The oil or tar passes out of its channels perpendicularly to the compressed air,

FIG. 8. BATTERY OF CALOREX FURNACES.

and in so doing is struck with such force that it is thoroughly atomized. As the atomizer orofice is above the fuel exit, the burners cannot become carbonized or clogged. Only sufficient compressed air is used through the burners to thoroughly atomize the fuel and evenly distribute the heat throughout the furnace, which is about one-sixth of the air needed to provide the oxygen requisite for the perfect combustion of the fuel, and therefore a low pressure air blast of approximately 3-ounce pressure is placed under each hydro-carbon burner. To insure a steady flow of fuel to the burners, it has been found necessary to have a regulating cock having a V-shaped knife-edged orifice, for the residuum in the fuel will settle around the seat of a globe valve, and in a short time entirely cut off the fuel supply to burners.

"The regulating cock has an adjusting device which, by means of a little set screw, can be set so that the fuel supply is cut to the minimum and yet insuring at all times

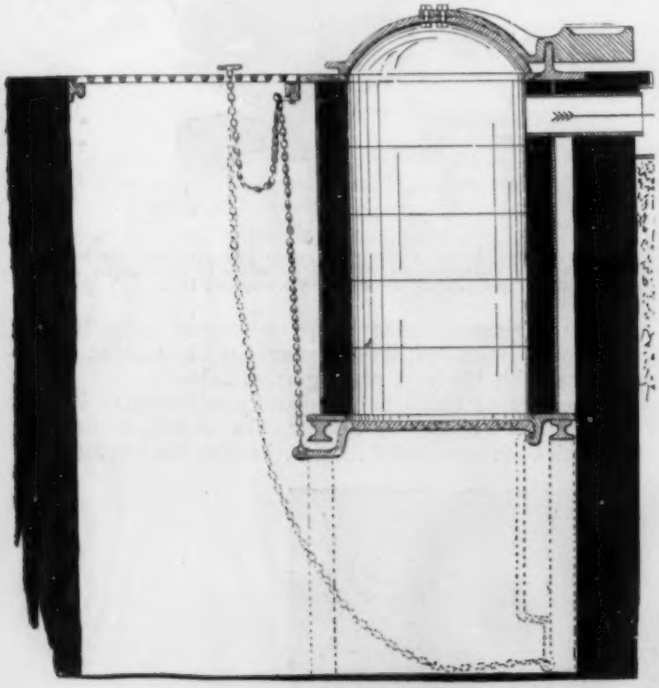


FIG. 9. STANDARD BRASS FURNACE.

that sufficient fuel is being fed to the burner to give the required heat. In order to obtain results from liquid fuel in any service, the fuel supply must be steady, and therefore this regulating cock is of infinite value."

STANDARD BRASS FURNACE.

Still another form of pit furnace, as shown in Fig. 9. This is known as the Standard Brass Furnace (patented), manufactured by the J. D. Smith Foundry Supply Company, Cleveland, Ohio, and the principal claims for it are as follows:

It has a sliding top cover, with counter-balanced weight, enabling the operator to open the furnace with a slight pressure of the foot. It has a round cover, which does not warp as quickly as the ordinary style, and has an extra ring on the top plate, which can be easily replaced when burned out, thus saving the expense of an entire new top. The easy dumping device is another feature. A slight pull on the chain dumps the grate, and the furnace man does not need to go into the pit while the furnace is hot. It is easy to reline, the entire job, including breaking out and relining can be done in one and three-quarter hours. The furnace is built in three sizes, taking from up to a No. 40 to a No. 200 crucible.

The furnace body itself consists of a steel sheet lined up with firebrick, and aside from the special features mentioned above, does not differ materially from others of this type. It is used with natural draft with coal or coke.

PORTABLE CRUCIBLE FURNACES.

Following the pit furnaces which are capable of being used singly or built up in groups, come the furnaces designed to set on or below the floor level and used with natural or forced draft and fired with coal, coke, oil or gas. The Paxson-Sheeler furnace, known as the S. H., shown in cut, Fig. 10, is manufactured by the J. W. Paxson Company, of Philadelphia, Pa., and is described by them as follows:

"The S. H. furnace is a forced draft crucible furnace about three feet in diameter, built to suit any ordinary size crucible, and any number of them can be worked, either individually or collectively, all being connected one with the other and governed by draft dampers direct from the blower, so that the metal is under absolute control, both in the melting and time that is desired, ready for pouring. By this system the metal is coming all day long (every few minutes if necessary) just as it is wanted, enabling the molders to finish orders without waiting for metal and making shipments promptly on the day they are promised. 160 pounds red brass scrap can be put in a No. 60 crucible and melted down ready for pouring in 45 minutes, with a loss of 1 per cent., and the same quantity of yellow brass in 35 minutes.

FIG. 10. PAXSON-SHEELER FURNACE.

"Turnings, which are always run at a loss in metal, were melted in a S. H. furnace with the minimum loss of any furnace on the market, only 1½ per cent."

This furnace, as will be seen in cut, makes use of an old crucible set upon the top, which serves as a hopper. The scrap material in small pieces being fed into it, becomes heated up and gradually works down into the crucible set in the furnace below, thus making quite a saving in time of melting. Some of the specifications and performances of the furnace follow.

(To be continued.)

THE PHYSICAL PROPERTIES OF MONEL METAL IN COMPARISON WITH MANGANESE BRONZE AND STEEL.

By C. S. Dunbar.*

Among the newer alloys, none has attracted more interest than Monel metal, so called. This is on account of the physical properties it has shown to possess, chief of which are its high tensile strength, combined with easy machining qualities; its high resistance to corrosive action and its resistance to fatigue strains. This latter very desirable property, as recently shown by alternate stress test in our laboratory, puts it out of the class of alloys in this respect, and entitles it to rank with steels of moderate carbon content.

The above qualities, with the many obvious uses awaiting such an alloy, would give it a place commercially, even were it not available as a "natural" alloy at a price very much below the cost of producing it from its two principal constituents, copper and nickel. It is the purpose of this article to compare Monel metal, by actual tests, made in our chemical and physical laboratories, with high grade manganese-bronze and the grade of steel to which it nearest conforms physically. Comparing first, the tensile strength, elastic limit, and elongation with manganese-bronze with nickel steel; the manganeze-bronze and the Monel metal being rolled rod, and the nickel steel being automobile crank shaft stock (heat treated).

The chemical analysis of each, taken from our records, is as follows:

Manganese Bronze.	Monel Metal.	Nickel Steel.
Copper 57.47%	Copper 27.79%	Carbon ..... .35 %
Tin ..... .71%	Silicon .... .23%	Phosphorus . .023%
Lead ..... .18%	Manganese 2.72%	Manganese .. .48 %
Iron 1.60%	Iron 2.31%	Sulphur ..... .025%
Zinc 40.04%	Nickel 66.95%	Nickel .....3.50 %

The physical test results are as follows:

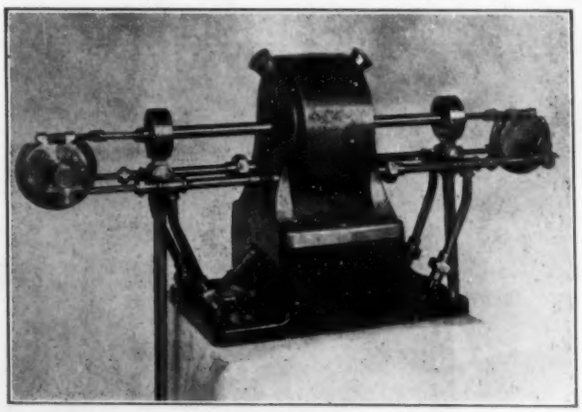
	Manganese Bronze.	Monel Metal.	Nickel Steel.
Elastic Limit per sq. inch	46,200 lbs.	76,500 lbs.	81,100 lbs.
Maximum Strength per sq. inch	80,600 lbs.	105,500 lbs.	107,700 lbs.
Elongation in 2 inches	26.0%	19.5%	21.5%

Below is a comparative table on alternate stress tests:

Manganese Bronze.	Monel Metal.	Nickel Steel.
Load applied to ends of specimen, 75 lbs.; fibre stress, 26,500 lbs.	Load applied to ends of specimen, 80 lbs.; fibre stress, 28,270 lbs.	Load applied to ends of specimen, 155 lbs.; fibre stress, 54,800 lbs.
Specimen broke after 1,900,000 revolutions.	Specimen was run 12,000,000 revolutions; load was then increased to 110 lbs, fibre stress 38,870 lbs. Specimen broke with increased load after 2,800,000 revolutions.	Specimen was run 11,000,000 revolutions; load was then increased to 185 lbs., fibre stress, 65,400 lbs. Specimen broke with increased load after 900,000 revolutions.

It must be borne in mind that the above nickel steel was previously heat treated for automobile use, and that such steel represents one of the greatest fatigue resisting steels known to science. However, numerous tests of carbon steels show that rolled Monel metal will equal about 40 to 50 per cent. carbon, heat treated steel in fatigue resistance. Brasses and bronzes do not show up very well in the fatigue test; in fact, the sample of manganese bronze referred to above represents a high standard for such alloys in that respect.

It is not meant by this that brasses and bronzes have no fatigue resisting qualities, but that the fatigue strain applied must be a very light one. This is particularly true of cast brasses and bronzes. Where steel will withstand a fiber stress equal to about two-thirds its elastic limit for a considerable length of time, such alloys will not withstand more than one-half and sometimes not more than one-third of their elastic limit. A representative tensile strength on Monel metal in its natural cast condition, gives approximately 60,000 lbs. maximum strength per square inch; an elastic limit between 35,000 lbs. and 40,000 lbs. per square inch.



STANDARD ENDURANCE TESTING MACHINE.

Numerous tests made on Monel metal show that the strength is considerably influenced by varying proportions of manganese and iron. Greater strength is produced by increasing the percentages of these two elements, particularly iron; at the same time, increasing the elastic limit, but, which in the natural cast state, is rather low in proportion to the maximum strength. This, of course, lessens the machining qualities somewhat. In general, it may be said that Monel metal in its natural, cast condition is about equal in strength to good grade cast manganese-bronze in the same condition. That the strength can be increased by rolling to a point equal to a good grade of nickel steel. It is a metal, however, that requires considerable skill in melting to produce a perfectly solid casting, and a thorough knowledge of the peculiarities of nickel and its alloys is most essential.

A cut of the machine on which these tests were made is herewith shown.

A description of this machine, together with a sectional view, was published in The Metal Industry,* January, 1908.

THE THREE AGES OF CIVILIZATION.

The progress of civilization, metallurgically, divides itself into three periods. These three subdivisions are commonly called the Stone, Bronze and Iron Ages.

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* Secretary Henry Souther Engineering Company, Hartford, Conn. Formerly Metallurgist, American Brass Company, Waterbury, Conn.

* American Edition.

THE MILL IN THE FOREST.

By Palmer H. Langdon.

When a hundred years ago a few enterprising Connecticut Yankees began to produce sheet brass and brass buttons they had to clear the forest growth from the hills and valleys, build shops with their own hands and make a good part of their own machinery. From these small beginnings have grown the great brass industry of the State of Connecticut. The rural communities and wooded country of the time of the founders have given way to thriving cities and industrial towns.

How different are the methods and problems of to-day when a new mill is projected. First there must be a million dollar incorporated company with enough offices to satisfy the ambitions of every one interested. Then there must be employed the best technical talent obtainable to build the mill and finally the smartest commercial men must be selected to sell the product. In the course of a year or less from the date of organization the plant is generally ready to supply the world's markets in the face of all kinds of competition. Few, indeed, nowadays would think of constructing a rolling mill or tube plant without ample capital, ample talent and ample railroad connections.

THE VILLAGE IN THE POMERAUG VALLEY.

An exception to this modern procedure and what might be termed a replica of the early days of mill building is found in the recently completed tube mill of the Hawkins Company, at South Britain, Conn. Here, as seen in the illustration, is a veritable mill in the forest. It is located three miles from any railroad station and is a mill which has been built almost entirely by the founders themselves, viz., Ira Lincoln Hawkins and Ferdinand Deming.

The financial and business details required by this forest mill were attended to by Mr. Hawkins, who is a manufacturer of traps that are known in all of the trapper countries of the world. The construction end of the mill and its equipment fell to the direction and labor of Mr. Deming, whose main capital was rolling mill knowledge. The task before these two men was a considerable one, but with characteristic Connecticut energy they set to work to build their mill.

Some sixteen miles southwest of Waterbury there is a small 200-year-old town of the name of South Britain and containing some 200 inhabitants. The main pride of the village is that it has maintained a public library since 1793—a library that first circulated from farmers' houses and only within the last few years acquired a snug 20 x 20 home of its own. But besides a library South Britain had a flowing river by the name of Pomeraug and a river to a Yankee at once suggests possible power. The builders, therefore, turned to the site on the river bank of an old abandoned grist mill and in the fall of 1906 they began to clear the land to make ready for the mill and then put the old broken-down dam in damable shape. Plans were then drawn for a 250 x 90 ft. tube mill.

Like all things that are successful in life, the first necessity for the mill was a firm foundation and instead of sending for some one to supply the foundation material the Pomeraug men went down to the bed of the river with dynamite and blew up enough rocks to use in the under-pinning. They also secured from the river the sand for making the concrete with which they built a five-foot wall. They must next blast out the rock for the tail race, then build the foundations and the masonry end of the job was finished.

From masons the projector builders had to become lumbermen. The surrounding hills were covered with standing timber beckoning to those who had the energy and ability ot turn them into sawed lumber. Thereupon the Pomeraug lumbermen went into the forest on the banks of the Housatonic River, cut down what chestnut and hemlock they needed, slid the logs into the river, floated them down stream a mile to a sawmill and then hauled the boards overland to the site of the mill. They did not buy a stick of timber, even including the window frames. From lumbermen the mill builders had to become carpenters, erecting, themselves, with very little assistance all the framing, boarding and roofing of the mill; then they turned masons again to put in a concrete flooring and from masons shifted over to millwrights to lay down the flume and set up a 66 h. p. turbine wheel.

All of the outdoor work was finished before the winter of 1907, that the winter's work might be spent in the equipping and building of the machinery necessary to draw the tubes. This was where the experience of Ferdi-

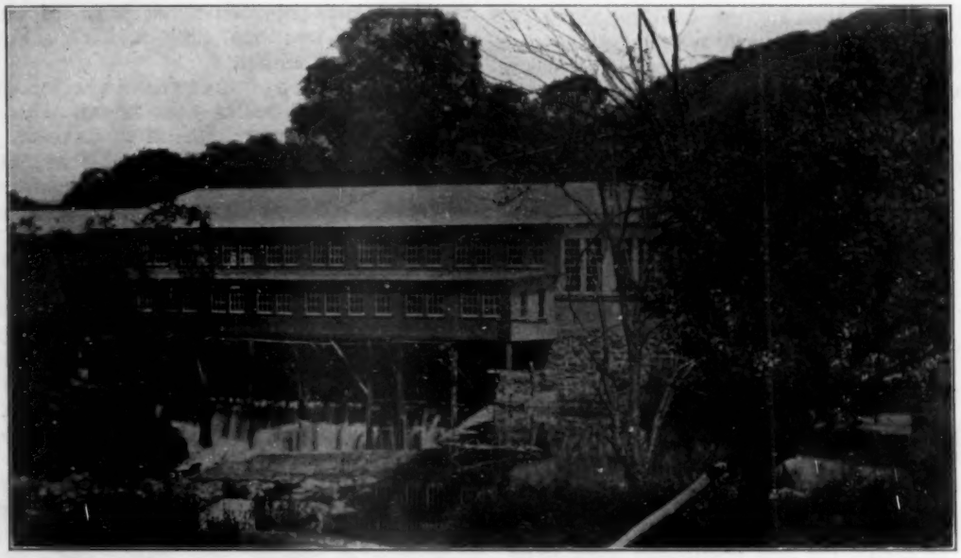
nand Deming was particularly valuable, for nearly all of his life he had been employed as a master mechanic in rolling mills, having made a specialty of tube drawing, and as has been mentioned in a former number of THE METAL INDUSTRY* has drawn seamless brass and copper tubes 24 inches in diameter and 12 feet long. Besides being connected with the various American rolling mills, he had had experience in Canada and England and for several years was in Spain, being in charge of a government arsenal engaged in the manufacture of cartridges. Mr. Deming's experience thus enabled him to make the machinery needed for the mill in the forest. The only machine parts that were bought were the castings. These were shipped to the mill, where they were finished and assembled. Mr. Deming also installed the casting and annealing furnaces, turning from machinist to furnace mason for the time being. During this period, as the opportunity offered, he would go to other rolling mills which were having difficulty in their mechanical departments and render expert service, getting them out of their trouble and putting the extra money earned into such equipment of the mill in the forest as was absolutely necessary to buy from outside sources. These outside purchases included belting and shafting.

*American Edition, October, 1908.

The years of 1907 and 1908 were spent in this way of slowly but surely getting the mill ready to produce tubing and finally in the summer of 1909 the Hawkins Company find themselves in a position to draw brass and copper seamless tubes of from one to four inches in diameter. During the time of constructing the plant the founders have been designers, quarrymen, masons, lumbermen, carpenters, millwrights, machinists, tool makers and finally tube makers.

Corresponding to all other Connecticut rolling mills, the only nearby supply of raw material for the Hawkins mill is chestnut wood. Still, the builders believe that with their low cost of power, labor and what Yankee ingenuity they can muster, they will be able to compete with the other mills which are more advantageously situated.

The capacity of the mill in the forest is 200,000 pounds of tubing per month.



THE MILL IN THE FOREST.

BRASS AT THE NORTH POLE.

The current press says: "Dr. Frederick A. Cook, the Arctic explorer, on April 21, 1908, located the North Pole and marked the spot with an American flag enclosed in a brass tube."

In view of the fact that the use of copper, bronze and brass antedates that of iron and steel by hundreds of years, it is not at all surprising that brass should be the metal selected by Dr. Cook as best suited to mark the spot of FARTHEST NORTH. It is merely the survival of the fittest. Brass is most admirably adapted to withstand all sorts of atmospheric conditions; it does not rust, and in certain combinations it is not acted upon by salt water, and while we do not know from the meager information at hand as to the exact composition of the brass tube used, we will assume that it is of a mixture best calculated to stand the ravages of the extreme climatic conditions at the Pole.

Of course the tube with the flag enclosed will undoubtedly float away, but the fact remains (Dr. Cook says so and, until his statements are refuted, we cannot doubt him) that it was planted there, and mankind could do no more.

SOLDERING PLATINUM.

Soldering ordinary platinum vessels is ordinarily done with platinum itself as the soldering material, or with pure gold; using the oxyhydrogen blow-pipe or its equivalent melting flame; but the latter has the great disadvantage that it melts at a lower temperature than the platinum, and under temperatures to which crucibles or other vessels may be subjected, it melts and leaves the crack open.

In the "Central-Zeitung für Optik und Mechanik" it is recommended to close the crack with a mixture of platinum powder and turpentine oil, then to heat the joint to a white glow, and in this condition to hammer all together. Another method, applicable where the crack is on the edge, consists in hanging a narrow strip of platinum sheet over the crack, then placing the article in the fire, heating it white hot, and hammering if necessary.

According to the "Metall-Arbeiter" a small hole may be closed by a rivet made out of platinum wire, welded after hammering both heads closely. For larger holes a patch is made of platinum sheet, riveted on, and then welded.

STANDARD SOLUTIONS FOR MANUFACTURING JEWELERS.

Detailed Instructions for Compounding and Manipulating.

By Oscar A. Hillman.

(Continued from August.)

The acid pickles and dips are generally the first solutions used by the colorer when preparing jewelry for its final finish, whether the articles are made of gold, silver, copper or brass. And as more work is irreparably spoilt by improperly made or carelessly used dips than by all the other solutions used in the coloring or plating departments, they should receive the undivided attention of a person who thoroughly understands the action of the different acids, and what happens when they are mixed together.

When gold, silver or brass jewelry has been hard soldered or heated to a dull red for any other reason, it becomes covered with a superficial coat of oxide of copper which must be removed or converted into metallic copper before the articles are in a fit condition to dip. As dilute sulphuric acid readily reduces the oxide to a metallic state without attacking the jewelry, the well-known pickle composed of six parts water and one part oil of vitriol, used hot, is the best and cheapest to use.

Although some colorers use a pickle made of two parts water and one part muriatic acid, it is far inferior to the one made with sulphuric acid, and cannot be recommended for general use.

After solid gold has been pickled it should be given a quick dip in warm nitric acid which will remove the film of copper from the work and leave it a uniform light green color. In order to remove the green coat which is an alloy of gold and silver, and leave the work bright, it is stripped in a hot solution composed of

Water	1 gallon
Potassium cyanide	4 ozs.
Potassium carbonate	2 ozs.

The solution gives better results if used hot, although it is never advisable to have it in actual ebullition; about 180 deg. Fahr. is best. A small carbon anode should be suspended on the negative wire by a strip of pure platinum, the articles to be stripped connected to the positive wire. To obtain the best results the work must be kept in motion while being stripped.

Silver jewelry, after being pickled, is dipped in a hot nitric acid dip that contains about a pint of water for each gallon of acid; a small proportion of water improves the action of the dip, but an excess will cause it to pit the work and make it very rough, and must therefore be carefully avoided. After the work has been fire-dipped it is of a grayish or white color and must be scratch-brushed with a fine brass wire brush, well moistened with licorice or bran water to make it clean and bright.

German silver or brass jewelry looks as if it had been copper plated when it is taken out of the pickling vat, as it is covered with a heavy coat of dark red copper which must be dipped off before the work can be bright dipped. Some grades of German silver turn dead white in the pickle and are all ready to brighten up, but most grades assume a copper color and must be treated as brass.

The dip that is used to remove the coat of copper from the brass and German silver jewelry is made by heating the old bright dips to about 150 deg. Fahr., then add about two quarts of oil of vitriol for every gallon of bright dip.

The copper dip works very rapidly so the work must never be left in it for any length of time; the proper way to use it being to dip the work in clean hot water, shake it, dip in the acid and immediately plunge it in clean cold water; examine carefully and if any traces of the copper remain repeat the operation.

When the copper has all been eaten off, and the articles look clean and quite bright, they should be dipped in hot water, shaken thoroughly, so as to shake off as much water as possible, then dipped for a moment in the regular bright dip, composed of:

Nitric acid	2 parts
Oil of vitriol	1 part
Muriatic acid, ½ pint per gallon of dip.	

Always add the muriatic acid last, pouring it in very slowly, letting the dip cool off before using. The above dip will yield good results on any grade of brass or copper work, but if the articles to be dipped consist of high brass exclusively, equal parts of nitric and sulphuric acid, with the addition of muriatic, will work better and last longer.

If a stream of hydrogen gas can be forced through the dip it will work better than it will with the muriatic acid, but as it is very difficult to force the gas through the dip without losing considerable acid, the use of a small quantity of muriatic acid is recommended. Some formulas for bright dips call for muriatic acid, common salt and chloride of ammonium, but if the acid is used the salts are useless; in fact, they will do more harm than good.

The bright dip should never be made in larger quantities than absolutely necessary, as it works best when newly made and deteriorates very rapidly, especially if left uncovered; the most practical plan is to make a small dip and as soon as it works too slow, empty it in the copper dip and make a new one. When the copper dip works too slow, add about a quart of oil of vitriol to each gallon of dip and allow it to cool so that the copper and zinc that the dip contains will be crystallized as sulphates, then heat again and the dip will be almost as brisk as when new.

Matt dipping is done in a hot solution, made by dissolving six ounces of clean sheet zinc in a gallon of hot nitric acid; when the zinc is all dissolved, pour in oil of vitriol very slowly until the dip looks white, then heat to about 160 deg. Fahr. and test with a piece of the work that is to be dipped; if the matt is too coarse, add oil of vitriol slowly and try again. An excess of nitric acid or the presence of water in the dip gives a coarse, rough finish; by carefully adding oil of vitriol a fine sand-blasted effect is produced. The dip works best when about twenty-four hours old.

The dip must be stirred with a glass rod (never use a wooden paddle) every time a batch of work is to be dipped, as the sulphate of zinc settles to the bottom very quickly.

Never put any muriatic acid in a matt dip; if the matt is wanted bright, pass the work through the bright dip after matting.

Although the addition of white arsenic and chloride of aluminum to matt dip solutions is quite extensively advocated by trade journals, they are absolutely useless; in fact, the aluminum is a source of trouble as it sticks to the work in little lumps, forming warts that are almost impossible to dip off.

(To be continued.)

METALLURGY FOR JEWELERS.*

ENGLISH PRACTICE.

COMPILED BY J. HORTON.

Art in the jewelry trade has been the theme of many lectures, papers and public discussions. But it is the exception rather than the rule to have the metallurgical side of the industry made the subject of a paper by a member of the trade. An interesting departure in this direction was made at a recent meeting of the Birmingham Metallurgical Society, when a paper on "Metallurgy in the Jewelry Trade," was contributed by Mr. T. J. Mountford, a former student of the Birmingham Municipal Technical School, who is now actively engaged in the jewelry industry.

The difference between the needs of the old jeweler's factory and the modern, Mr. Mountford points out, is very great. The old jewelers were content with very few alloys—18 karat gold for rings, "colored" gold (that is, 12 to 15 karat), and "bright" gold for pin stems and brooch tongs, being all that they required. Some of these old alloys are still used, but a larger number of new ones have been introduced to meet modern conditions of jewelry demand and manufacture. Among these may be mentioned, 18-karat ordinary, 18-karat setting, 18-karat hard for wire, 18-karat enameling, 15-karat ordinary, 15-karat setting and enameling, 9-karat ordinary, 9-karat soft, 9-karat enameling, and 9-karat setting. To these may be added several alloys for common gold for pin stems, with two or three variations of each quality for special purposes, and all the different solders used respectively with each alloy of the series.

Under modern conditions of trade regulation and assay it is necessary to have the solder of a standard not much below that of the alloy upon which it is used. In Australia, for instance, as Mr. Mountford points out, the article when cut up and melted must now assay within ½-karat of its reputed standard. This, of course, cuts out the use of low quality solders in 9-karat work.

The alloys or mixtures of gold, silver and common metals used in the jewelry trades are, for ordinary purposes of manufacture, very simple, but there are many complex ones made for special purposes. In the higher qualities, Mr. Mountford advises keeping the alloy to three constituents, gold, silver and copper. In low qualities, other metals do not have so injurious an effect. For example, zinc added, even in small quantities, to 18-karat gold makes the alloy so brittle as to be unworkable, but it may be added, as part of the alloy, to 9-karat gold, either in small or in large proportions—according to the purpose for which it is required—with the best results. In fact, it gives in such alloys the very qualities required, toughness and hardness.

The standard mostly in use now is 9-karat. The other 15 parts are made up of silver, copper and "compo." The "compo," a mixture of copper and zinc in various proportions, is used as a convenient means of introducing zinc into the melting pot without loss through burning. Any shade of color from pale yellow to deep red can be obtained in 9-karat gold by varying the relative quantities of the alloying metals. But 9-karat is the most difficult of the principal standards to melt in such a way that it may be thoroughly reliable in working up, the zinc in the "compo" usually being the cause of the trouble. Mr. Mountford's experience, however, is that if the "compo" is put at the bottom of the melting pot, then the copper, upon that the silver, and then the gold, with powdered charcoal as the covering, the mixture is highly satisfactory, and the loss on a fairly large melt amounts only to a few grains.

With regard to the temperature at which to melt, Mr. Mountford advises that it should not be too high. The melt should be well stirred. In pouring a stick should be held against the outlet of the pot, so that the gold in running into the mold shall just touch it. This reduces any scale that may form in the act of pouring. The pouring is done at slightly lower temperature than that of melting. As a rule the cause of the gold coming blistery or "spilly," unless lead or soft solder has got into it, must be looked for in the melting.

COPPER FOR GOLDSMITHS.

Mr. Mountford, having tried many kinds of copper in gold alloys, finds the most satisfactory to be the Swedish copper wire, this also, by the way, being also the most costly. Among the objections, from the goldsmith's point of view, to drop copper Mr. Mountford mentions the following:

(1) The enlargement of surface liable to oxidization in proportion to the total weight of metal.

(2) It is not always clean, dust getting into it as it lies in the warehouse. When dust is weighed out with the copper there is a loss in melting which cannot always be accounted for.

(3) It has not been worked.

With other coppers which Mr. Mountford has tried there has been now and then a split ingot. He has tried the melting and treating the copper by itself, so as to reduce any oxides that might be present, but has obtained no better results. Mr. Mountford leaves this part of his subject with an observation which he no doubt intends to have a more general application in his trade:

"When it is possible to find a jeweler's factory with a properly equipped laboratory many problems that crop up day by day will be problems no longer."

SCRAP AND FLUXES.

Scrap, Mr. Mountford insists, should always be boiled out in pickle before being weighed into the warehouse, as when the scrap is discolored from annealing it is practically impossible to distinguish the difference between some of the qualities; whereas, after boiling out a keen eye can readily do so. Great care should be taken that no soft solder is left in the scrap. The scrap from jobbing men in particular should be carefully washed, as lead and tin are the anathema of the jeweler's shop. In melting scrap the pot should be a good bright red to start with, as it is important that the gold should run down quickly to prevent oxidation, which it is imposible to avoid if the pot is cold to start with. The covering should be powdered charcoal. If there is much small scrap one or two pellets of salammoniac will clear the surface. In dealing with "lemels" or filings and sweepings from the men's boards various fluxes are used, the chief being KNO_3.

The fluxes are mixed with the lemel and all run down in a skittle pot, more flux being added until by the action that this is taking place it can be seen that

*From T. J. Mountford's paper, read at Birmingham Metallurgical Society meeting.

the copper and silver, with all impurities have been taken up. If this is done properly, the lump usually assays about 23-karats fine. As a correct sample for assay cannot possibly be taken to start with, and the chemical action is very violent at times, it is impossible to estimate the amount of gold lost through spitting. As the reduction of the lemel does not eliminate any platinum that may have been in the metal, the bar produced after repeated reductions becomes in the time quite unworkable. Therefore the general practice is to reduce the lemel and sell the bar at once to the refiner, who with his large plant can treat it at less expense.

THE COLORING OF GOLD.

With the coloring of gold Mr. Mountford in this paper deals somewhat briefly, the subject being adequate for treatment in a special article of its own. It is also about which there has always been a great deal of controversy. Mr. Mountford, however, has spent a great amount of time in the investigation of it, and he gives a useful summary of the present state of knowledge on the subject.

Fifteen-karat and 18-karat are the qualities generally used and the coloring operation is more a chemical than a metallurgical one. It is the dissolving from the surface of the article of parts of alloying metals, and some gold, and the deposition of gold from the color mixture, the latter, Mr. Mountford thinks, taking place toward the end of the operation. This leaves the surface of a higher quality and, as seen through a microscope, spongy or matted. It is in such a condition that when brushed by a fine wire scratch brush driven upon a lathe there is obtained a beautiful matted surface that will last many years in use. The success of this operation depends, first, upon the alloy to be colored; secondly, upon the constituents of the color mixture; thirdly, upon the high polish and finish of the work before coloring. The last point is most important. If the work is polished as left from the rouge mop, washed out and annealed there is a marked difference after coloring in the surface as compared with that color from the emery buff or pumice buff, while, as the time for immersion in the color-pot is less, there is less risk of the solder lines in built-up work showing.

If the alloy is a red one, with an excess of copper, the surface when colored will be coarse and rough. A pale alloy with an excess of silver will have a surface with a hard, somewhat bright appearance. The chlorine liberated in the coloring process has a greater affinity for the copper than the silver, so that the surface of the red-alloy is attacked to a much greater extent. A great deal of mystery has been made in years gone by about the composition of color mixtures, but Mr. Mountford says that to a metallurgical student there is no difficulty when once the alloy is fixed in finding a suitable color. It should always be remembered that the mixture should be quite thin and when hot, a liquid, and not a semi-solid. The work, of course, before coloring should be thoroughly cleaned and free from pickle. In hollow work, in order to enable the pickle to escape, there should be a hole at each end. Otherwise the subsequent annealing does not drive it out—at least not all of it—but merely dries it up. Then, as the work goes into the color some is forced out and causes subsequent trouble, because the work may look bright enough, directly the scrap brush touches it the colored surface flakes away, usually from near the hole. This can be obviated by boiling the article in water after pickling, and then annealing it before coloring.

The safest pickle is dilute nitric acid, for then if a trace of it should be left in the work stripping of the color need not be feared. Sulphuric acid when used as pickle has the effect of depositing the gold in coloring in a more or less granular form which is easily removed by the scratch brush. The chemicals employed in coloring are represented by the following formulæ: NaCl, KNO_3, HCL and water. The whole mixture when heated up gives up chlorine and nitrous oxide gas. Therefore, Mr. Mountford thinks, if there is H_2SO_4 present even in small proportions there is a tendency to form potassium sulphide or silver sulphide. As the discoloration shows more particularly around those ends of the work which hang highest in the coloring mixture, Mr. Mountford infers that as the work is put into the color the mixture goes in at the bottom hole and drives out through the top any pickle remaining inside, this, as it emerges, deposits a film which is the cause of color stripping.

It has been assumed by some that in the coloring process, the erosive action takes place in the first dip and the deposition in the second or subsequent dips after the addition of water to the color; but Mr. Mountford points out that the same action takes place if the coloring is done at one dip. He has assayed the color surfaces from different parts of the work and has obtained many different results, even when the conditions as to quantity of work, quality of gold, strength of color, time, etc., were identical, and in no instance did the assay approach near to fine gold. This proves, he thinks, that the beauty of the colored gold is not due to the gold alone. If 22-karat gold is colored the appearance is not so good as that of a 15-karat, while the surface, under the microscope, is much finer, the color skin is thinner and the wearing quality is not as good as that of 15-karat.

GILDED SURFACES.

There are indications of a change in fashion as to finishing work. Of late years, the favorite finish has been bright. With regard to bright gilding solutions, Mr. Mountford has tried a great number of experiments with various complicated solutions. Some worked well for a short time; then unaccountably went wrong; others deposited quickly, but unevenly, and soon lost their gold; while others had the disadvantage of depositing slowly and so the work lost its fresh appearance. When the current was increased they could not work economically enough. This caused Mr. Mountford to work backward to the simpler solutions. The troubles with bright solutions, as enumerated by Mr. Mountford, are:

(1) Inability to obtain the correct tint with the varying bunches of work.

(2) The solutions not lasting long in use—many gilders using a fresh one each day.

(3) Discoloration round the holes.

(4) The brightness partly lost, and often having a dull stain.

(5) The high parts in the pattern being gilded, while the undercut parts are not.

The gilt is usually obtained by the use of brightening liquids of which carbon bisulphide is usually the base. These are a constant cause of worry, especially in small solutions, such as a jeweler uses. Therefore, Mr. Mountford does without them as far as possible, as work done with their aid has a tendency to tarnish in stock and causes a great deal of trouble, as it necessitates refinishing.

(To be continued.)

A FIRELESS METHOD OF PHOSPHORIZING METALS.

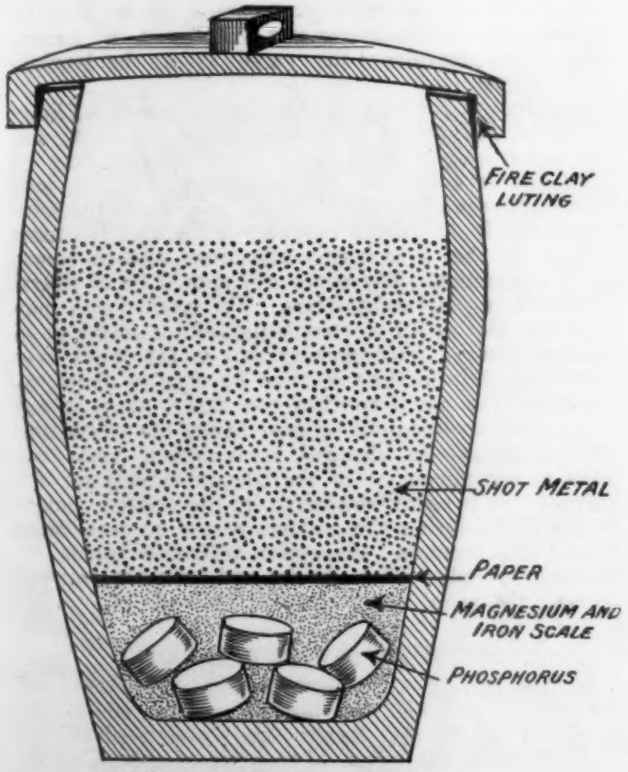
By Burton T. Moore.*

An entirely new process for producing accurately proportioned alloys or mixtures of phosphorus with copper and tin has been employed by me for some time. The chief advantages of this method lie in the fact that no fire is necessary, thus eliminating all danger of explosions, etc., and that there is absolutely no loss of phosphorus, as in the regulation methods hitherto in use. The details of the process are as follows:

BURTON T. MOORE.

The phosphorus is used in 2½-pound cakes now common in the market. These cakes are first immersed in a strong copper sulphate solution until they acquire a coating of metallic copper, owing to the galvanic action set up between the phosphorus and the copper, whereby the copper is deposited on the phosphorus in metallic form. This operation will take about one-half hour. The copper coated cakes are then thoroughly dried by rolling in sawdust, the adhering sawdust afterwards being blown off with compressed air.

A requisite amount of phosphorus is then weighed out and placed in the bottom of a perfectly dry graphite crucible, see cut. On top of the phosphorus is placed a layer of a mixture of equal proportions of magnesium metal, reduced to a powder by grinding the metal on a wheel or by filing, and finely ground iron scale, rolling mill scale will do. A layer of some form of bibulus paper such as filter paper is then put on top of the magnesium-iron mixture. The pot is then filled to within about four inches of the top with shot copper or tin, as the case may be. A cover is then luted on the crucible with fireclay, and the whole allowed to stand for one-half hour or so in a warm place.



CRUCIBLE READY FOR ACTION.

Chemical action now ensues between the magnesium and iron, and owing to the rapid oxidation of the former by the oxygen furnished by the latter, heat is generated which quickly melts the phosphorus. The temperature quickly rises until the copper or tin is melted, and the phosphorus uniting with the molten metal forms the desired mixture. This operation can be readily performed on 200 pounds of metal at one time. In the case of phosphor-copper, 4 ounces of the magnesium-iron mixture to the 100 are needed, but only half this amount for phosphor-tin.

The copper or tin is best used in shot form produced by first melting the metal and pouring into water through a screen. The compound produced by this process is perfectly homogeneous, and will contain the exact amount of phosphorus that it is desired to introduce. There is absolutely no danger attached to the manipulation of the phosphorus, it being protected by its copper coat, and no chance for explosions, as sometimes attend the fire method. No loss is experienced, as all of the phosphorus put into the crucible is utilized, which, of course, is not the case when a phosphorizer is used in an open fire. The main precaution to be taken in the above process is to have the phosphorus absolutely DRY, so that no steam is generated in the crucible.

* Superintendent Brass Foundry Bethlehem Steel Company.

AMERICAN EXPOSITION IN BERLIN.

An American Exposition will be held in the city of Berlin, Germany, during the months of April, May and June, 1910, in the well-known Exposition Palace near the Zoological Gardens, located in the best and most frequented part of the city.

The American Exposition is intended to educate the European, especially the German population, to the importance and excellence of American manufactured products, and thus to strengthen the existing cordial relations and to stimulate trade between the two countries.

The German committee will advertise the Exposition extensively throughout the German Empire and elsewhere by means of posters, announcements in railway cars and in the daily press. They will cooperate with American manufacturers and exporters in every way to popularize and exploit American products in this large and lucrative market.

The various committees having the Exposition in charge are:

American Advisory Committee.—Dr. George F. Kunz, chairman; Emil L. Boas, Frederick Dielman, Herman Ridder, Gustav H. Schwab, Francis H. Stillman. German Advisory Committee.—Baron R. von Brandenstein, chairman; Gouverneur von Bennigsen, Ernest Cohnitz, Max Kemmerich, A. Willnerr. American Headquarters.—Max Vieweger, manager, Hudson Terminal Buildings, 50 Church street, New York. Bankers: Speyer & Co., 24-26 Pine street, New York.

COLD PROCESS OF ELECTRO-GALVANIZING*

By Wm. Schneider.

To the average practical plater further discussion on the problem of cold electro-galvanizing is merely a repetition of what has been previously said on the subject. Nevertheless I would like to suggest a cold electro-galvanizing solution which I have no doubt surpasses any of those being used by the trade in general. The time at my disposal will permit of but a brief discussion from my point of view.

To those who have followed the process of cold electro-galvanizing closely, it is obvious that each succeeding year has found it reduced to a much more scientific basis, until at present there seems to be but little room for improvement. There is no doubt in my mind, however, that a few years hence we will find it far nearer to perfection than it is today, and the cost of preparation materially reduced.

It is known that the process of electro-galvanizing consists of the placing of the articles to be coated with zinc in a zinc salt solution and passing a current of electricity through the solution. This process has made galvanizing very simple, and the work can be done today by any experienced plater. This process is entirely unlike the previous methods, and no longer depends on the dissolving of the zinc anodes to keep the electrolyte in good working order and bring about the desired results. The solution which I have found superior to any other, consists of the following, boiled well together:

1 gallon of water.
2 lbs. sulphate of zinc.
2 ozs. sulphate of aluminum.
½ oz. glycerine.

E. M. F.—10 amperes to 1 square foot of surface. The work must be agitated while being coated; for this purpose there are numerous apparatuses on the market which are readily adjusted to the plating tub.

In this solution it is imperative that pure zinc anodes be used if satisfactory results are to be obtained. The results on the iron, which must be perfectly clean, is much better than any I have seen. If this solution is carefully attended to it will plate a good light gray, and by the addition of a few of the various re-agents, of which there are several, such as glue, dextrine, on the market, a very bright deposit of zinc can be obtained. This process is most generally used for the protection of iron from rust, and is doubtless superior to any of the present-day methods of accomplishing this end. The writer invites criticisms on the above process.

ELECTROLYTIC PURIFICATION OF METAL BEFORE ELECTROPLATING.

By Dr. Robert Grimshaw.

Every practical man knows how important the thorough purification of any metal object is, before it is subject to electroplating. Until recently this preliminary operation was effected by mechanical means, as scrubbing, with occasional aid from a purely chemical process—in common parlance "pickling." Recently, however, there have been made experiments with a view to hastening and rendering more thorough and regular the preparatory step of attaining a perfectly clean surface to receive the electrolytic deposit,

There is, of course, nothing new and nothing specially scientific in electrolytic cleaning, which is exactly the reverse or converse of the electric deposition of metal, since its object is to remove from the surface of the object to be plated a very thin film of its surface metal, this taking with it any superficial impurities which might be adhering thereto. The gas which is developed at the time of the electric treatment plays, however, a greater rôle than the metal which is carried off; the loss of the thin film being necessary on one or the other of the "odes" in the bath.

The most simple and the best known process of galvanic cleaning is the cyanide process, which consists in simply hanging the object to be cleansed as the kathode in a cyanide solution. This process is the precursor of the more strictly electrolytic methods.

The solution now used consists of an alkali, such as soda or potash, with the addition of a trifle of a cyanide solution. The article or articles to be cleansed must be hung in this bath just as though electroplating were the object, and a strong current turned through them. There is at once a strong development of gas at the surface of the metal, carrying therewith the fat and scale. There is neither complication nor mystery about this process; the gas is developed on the surface of the metal; that is, under the fat and scale, and consequently carries with it these latter. The articles must not be hung as anodes, because in this case the gas development would be less and the separation of the metal greater. If there is no metal in the solution, none can be deposited on the articles to be cleansed.

It is requisite that the solution be sufficiently strong to be in itself a good solvent of fat, thus acting chemically to reveal the metal and enable the scale to be removed by the escaping gas bubbles—i. e., electrically. The presence of the cyanide favors the development of gas.

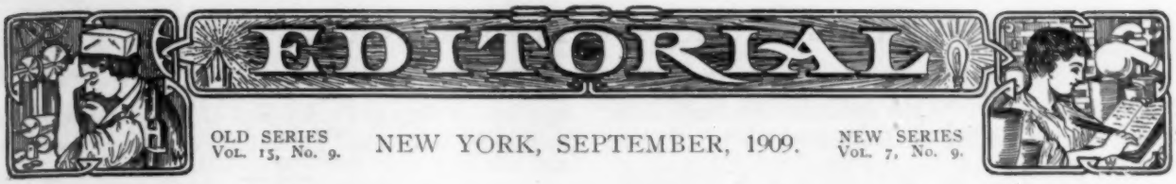
One receipt for making the solution names 4.5 liters of water, 227 grams of caustic potash, or soda, and the same weight of cyanide. The solution may be used hot or cold; but hot is preferable. The best temperature is about 65° C.; in no case should the solution boil. It is almost necessary to remind the users of cyanide that it is highly poisonous, and its fumes quite dangerous. The conductor should be of liberal diameter—say 4.4 millimeters. The work pieces may be hung, just as for electroplating, either singly or in baskets, always remembering that in the latter case they should from time to time be joggled about, as wherever the metal touches the basket there is apt to be less development of gas; hence the contacting surfaces should be changed from time to time. Six volts is recommended as the proper tension for the current. It is not advisable to let the articles remain in the bath, during the passage of the current, more than a few seconds. Inspection will soon enable the operator to judge when the fat and scale are removed without the metal being attacked too much.

*Paper read at September 3 meeting National Electroplaters' Association.

COST OF SILVERWARE IN SMYRNA.

In Smyrna, Polosi silver knives and forks sell for $1.70 to $2 the dozen; nickel silver for $1.45 to $2.20 the dozen, and electro-silver for $2.70 to $3.90 the dozen. The price of spoons of the above different metals varies from $0.20 to $2 the dozen. White metal knives and forks sell better than any other kind, although those with bone handles are finding an increasing demand, the price of the latter ranging from $1.45 to $2.90 the dozen.

French white silvered knives and forks sell well on this market, the prices being from $1.54 to $5.60 the dozen, also metal or galvanized-iron knives and forks from the same country.



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CONTENTS

BEARING METALS DISCUSSION.

A REVIEW OF THE CASE.

In another column of this issue of THE METAL INDUSTRY we publish a further phase of the controversy over bearing metals. This discussion started from a paper read at the Cincinnati meeting of the American Brass Foundrymen's Association, held May 17 to 22, 1909.

This paper was written by G. H. Clamer, secretary of the Ajax Metal Company, Philadelphia, and was entitled THE PATENT SITUATION IN THE UNITED STATES RESPECTING ALLOYS. Mr. Clamer in his paper reviewed the history of "plastic bronze," an alloy manufactured by his company, and traced its trials and struggles for supremacy through the law courts. The last legal phase of the case was developed when the Brady Brass Company of Jersey City, N. J., won its defended suit by the Ajax Metal Company for infringement of patent.

The Ajax Metal Company succeeded in getting a reissue of a patent upon another ground and the legal matter now rests. The original paper, with its criticism by Andrew Allan, Jr., of Andrew Allan & Son, of New York, was published in THE METAL INDUSTRY* for July and made very interesting reading.

In the August number of THE METAL INDUSTRY was published Mr. Clamer's answer, and in that article we find the issue growing larger and dipping more into the scientific end of the question. Now in this number we have Mr. Allan's answer to Mr. Clamer, and taking the two together gives us a very valuable and interesting dissertation on the subject of bearing metals. One of the points at issue seems to be just who should get the credit for the first discovery of these most important combinations of copper, tin and lead, etc.

Just who this credit belongs to really does not make much difference to the world at large, but the world is intensely interested in all that these men have done in developing these wonderful series of alloys. A large number of our readers are anxiously watching for each development of the situation, and read with interest and profit each point made by our expert correspondents.

The proper manipulation of the metals entering into these alloys require for successful results the most skilful and expert attention. And we have no doubt but as the discussion goes on, those interested will get many facts relating to the methods now in use for the manufacture of these copper, lead and tin compounds. Problems which have baffled attempts to solve them may be shown to be simple applications of metallurgical laws.

We also publish in our CRITICISM AND COMMENT column a communication from Charles Vickers, another authority on the subject.

*American Edition.

ARE PLATING SOLUTIONS PART OF PLANT OR SUPPLIES?

An Interesting Problem.

A recent fire, caused by the spontaneous combustion of chemicals in a plating establishment has brought us the following letter:

"In relation to the fire in our factory there has a question come up as to whether the plating solutions are supplies or part of the plant. They were covered in the policy as 'and any other appliances or devices used in the business.' Can you give us any information in regard to it?"

A letter written to a large number of platers' supply houses brought a bewildering collection of diversified opinions. We reproduce several that are illustrative of the different views taken of the matter:

Supplies, Not Fixtures.

"Replying to your esteemed favor which gives a question from one of your clients—the plating solutions are made up, of course, of that which was originally 'supplies,' viz.: nickel salts, etc., so I should say that plating solutions really are supplies. They are not 'a part of the plant,' because that would signify fixtures or something that is not consumed daily as the solutions are so consumed. However, it may be that this is a question for a lawyer's interpretation, as it relates to the liability of the insurance company, and it is possible, therefore, that one cannot answer questions of this kind intelligently without knowing just what it relates to—that is, the paragraphs in the policy which precede and succeed the paragraphs from which some one has drawn a conclusion.

"It is probable that two conclusions are drawn; first, that of the insured, and next, that of the insurer, so it becomes necessary, I assume, for a neutral party to decide, and that means either a judge or a jury, or possibly, a lawyer's decision would be sufficient."

"We have yours of the 26th, asking us whether plating solutions and supplies can be included as part of a plant in case of loss by fire. We think the ordinary rules of the Underwriters' Association cover a point of this character, and that there would not be considered as plant; items and supplies, such as chemicals, solutions, anodes and other material which are being continually used up in the performance of certain work. Any apparatus, fixed or movable, machinery, settings, connections, spare parts of machines, switchboards, wiring, tanks, vats and electrical appliances would be considered appliances and devices used in the business, or as 'plant,' which amounts to about the same thing."

"We duly received your favor of August 26 and would state that, in our opinion, the solutions are considered supplies and not part of the plant."

"Replying to your favor of the 26th inst., plating solutions will undoubtedly come under the head of supplies, as they are composed of materials which are constantly being used up and have to be replenished."

Part of Plant and Not Supplies.

"We are in receipt of your favor of the 26th inst. in which we note that one of your client's plating works recently burned down and had some difficulty in settling with the insurance companies as to whether solutions are supplies or part of the plant. We have never had this question come up in the number of years which we have been furnishing supplies to users, and many of them have met with fire losses, but from our understanding has always been that the supplies and solutions which had been damaged by fire or water are considered a loss equally as much as machinery or other materials which had been damaged by a similar cause."

"We have your valued favor of the 26th inst., and in reply would say that in two different corporations with which the writer was connected the plating solutions including tanks and anodes were carried in the plant account."

"Replying to yours of the 26th inst., beg to say we should consider that the solutions are part of the plant.

"We, ourselves, should consider plating solutions as part of the plant and the chemicals which are used for renewing these solutions as supplies. We believe upon consideration you will agree with us that solutions are practically fixtures and only have to be added to and refreshened.

"We would advise that we would certainly consider plating solutions as a part of the plant and not as supplies. We would state, however, that any salts or material which is on hand to be added to the solution from time to time would be considered as supplies."

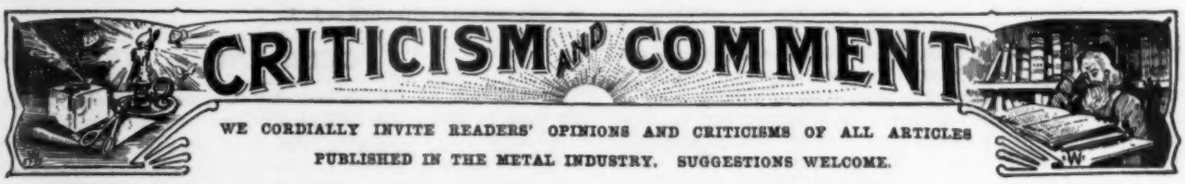
"In reply to your favor of the 26th inst., we beg to state that all plating solutions, raw materials and supplies of any kind used in the conducting of business are always included in the clause of the insurance policies as follows: 'And any other appliances or devices used in the business.' 'Appliances,' of course, is to cover all tools and materials, such as may be used in the legitimate course of the business. It stands to reason that a business cannot be conducted without the necessary materials to run the same. It, of course, would have been better had this clause been worded to include 'all raw materials used for the conducting of said business.'"

"We acknowledge receipt of your favor of the 26th inst., and in reply beg to state that plating solution is, without question, 'part of the plant' and not 'sup-

plies.' Seven or eight years ago we had a fire in our plant and a similar clause in our policy. The fire insurance company paid for the solution."

As the above replies come from various parts of the country, it appears that conditions vary with the locality. For New York, or the territory covered by the New York Board of Fire Underwriters, there is a clause in the fire insurance policy which, while it includes the solutions of a manufacturing chemist as stock in course of preparation, does not so cover electrotyping and plating solutions. It says that inasmuch as these solutions are essential to the business, they must be considered as part of plant, but they must be covered by a special clause inserted in the policy.

This, we think, covers the question and it resolves itself into a matter for the individual to take care of himself by seeing that his solutions are covered by a special clause, or are included as "part of plant." The insurance brokers should take care of this point.



CHARCOAL IN MELTING BRASS.

To the Editor of THE METAL INDUSTRY:—

We have read the article in your August number, entitled "The Use and Abuse of Charcoal in Melting Brass."

There is not the slightest doubt that your article explains the phenomena of charcoal used as a flux in brass melting in a very concise and yet clear manner.

We wish that the writer might have added something in regard to the cleanliness of the charcoal. The charcoal used for this purpose should not be "refuse." It should be fresh burned. Charcoal that has been exposed long is often permeated with foreign gases or fluids that it has absorbed in one way or another. Charcoal is a great absorbent and some things which it absorbs will entirely change its action when applied to a chemical use as it is in melting brass.

The charcoal screenings also often contain particles of baked clay from the kilns which we have known to have been poured with molten brass, causing defects in the castings. We say, therefore, that it pays the brass founder to secure good charcoal and clean.

R. MACKELLAR'S SONS COMPANY.

Peekskill, N. Y., August 21, 1909.

Our correspondent is entirely correct when he states that clean charcoal should be used. Too much care cannot be taken to get the best of material. When charcoal was mentioned in the article referred to, it was specified to use "chestnut size," which would necessarily ensure freedom from "screenings" containing probably everything else but charcoal.—ED.

REGARDING PATENTS ON BEARING METALS.

To the Editor of THE METAL INDUSTRY:

I found the letter of Andrew Allan, Jr., on Patents on Bearing Metals in the July number of THE METAL INDUSTRY* very interesting. Mr. Allan is quite right when he states that tin is unnecessary in a copper-lead alloy to hold the mixture together.

For some purposes, however, it is very necessary to use tin, otherwise the mixture is too soft and will not carry a load, but squashes. This is the case with car-journal bearings, for which purpose Mr. Clamer's mixture is largely used and is undoubtedly the best. Other metals can be and are used to harden the alloy in place of tin, but the alloy is more difficult to cast.

One such alloy which gave excellent service had the following analysis:

Copper	69.2%
Lead	26.1%
Manganese	1.7%
Tin	1.5%
Iron	1.7%

The question arises: Would this be considered an infringement on Mr. Clamer's patents?

*American Edition.

It may surprise Mr. Allan to learn that the art of amalgamating copper and lead is not the secret he imagines it is, but is a thing very easy of accomplishment.

Castings of such compositions as 50 per cent. Cu. and 50 per cent. Pb., also 60 per cent. Cu., 40 per cent. Pb., 4 per cent. sn. will turn out of the sand, showing the colors of a fine bronze and without the least oozing of lead. The difficulty seems to be not in making such alloys, but in being permitted to make them.

CHAS. VICKERS.

DEOXIDIZERS.

To the EDITOR OF THE METAL INDUSTRY:

It is frequently stated that aluminium silicon, magnesium, phosphorus and manganese act as deoxidizers, when added in small quantities to metals. Although this is the case as far as adding silicon or phosphorus to copper is concerned, it is very doubtful if they act as deoxidizers in all cases. In the case of phosphor bronze there is not much doubt but that the phosphorus hardens one of the constituent parts of the alloy and in this way toughens the alloy as a whole. This is a quite different effect to acting as a deoxidizer.

Deoxidization may take place to a certain extent. I have seen phosphor bronze castings quite spongy and full of dross owing to bad casting. Such a thing would be impossible if phosphorus deoxidized the metal. It was proved by analysis that the spongy metal contained phosphorus after it was cast. Manganese and aluminium in the rolled manganese bronzes most probably act as a "toughener" and "hardener" respectively. The aluminium also makes the alloy more fluid. It is very doubtful if they act as deoxidizers.

I never advise the use of small quantities of aluminium, magnesium or manganese in brass alloys for sand castings; better results can be obtained by careful casting and proper selection of the metal used.

ERNEST A. LEWIS.

Expert in Copper and Copper Alloy Manufacture.

Birmingham, England, July 26, 1909.

The metals mentioned above by our correspondent are so difficultly reduced from their oxides, that there does not seem to be much room for discussion, as to whether they act as deoxidizers at all times and under all conditions or not. They are so ready to revert back to their original state that they will combine with oxygen before they will form compounds with other metals. If the amount added to a pot of metal, either of copper, tin or alloy, be just sufficient to reduce existing oxides, the one used becomes a deoxidizer.

If more than enough is used, then other compounds are formed consisting of phosphides in the case of phosphorus, and eutectic alloy crystals existing in a matrix of a more or less mechanical mixture, in the case of aluminium, silicon, magnesium, calcium and manganese. This is what causes the sponginess so often encountered, and usually condemns the deoxidizer.—ED.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

ALLOYING

Q.—We have an inquiry for castings from mixture consisting of 66 2-3 per cent. aluminum, 33 1-3 per cent. magnesium, and inasmuch as we have had no experience in handling metallic magnesium, wish to inquire if you can give us any information regarding the methods of melting and pouring this mixture?

A.—In a general way, it may be said that the rules laid down for melting and pouring aluminum hold good for alloys of aluminum and magnesium. Magnesium oxidizes very readily and the manufacturers are now taking the precaution of putting it up in sealed cans like phosphorus. Hence, it is important not to overheat it or its alloys. In pouring, pour a steady stream and hold the lip of the crucible close to the pouring gate. The metal should be melted slowly. Molds should be bottom poured and the sprues rather long to keep the oxide and dross out of the castings.—J. L. J.

AMALGAMATING

Q.—We want a formula for amalgamating mercury and zinc for use with telegraph batteries:

Clean the zincs by pickling in dilute sulphuric acid (or muriatic) or scour with sand moistened with same. Rinse the zincs well and then immerse in a solution of:

Corrosive sublimate	10 parts (by weight).
Muriatic acid	12 parts (by weight).
Water	100 parts (by weight).

If smooth appearance is desired rub with a woolen rag, or if done in large quantities tumble in sawdust or bran.—W. C.

BRIGHTENING

Q.—Will you kindly let me know through THE METAL INDUSTRY the best brightener for silver solution to be used for flat ware (heavy plate)?

A.—Bisulphide of carbon and chloroform is the usual brightener for silver baths, but this can be replaced by benzole, used in the same manner by dissolving in cyanide or in some of the silver solution, with an excess of cyanide. The benzole will be found very satisfactory if a soft bluish shade is desired in preference to the bright lustre imparted by bisulphide of carbon. —C. H. P.

CASTING

Q.—Can you give me some information regarding the making of pattern letters and figures?

A.—Pattern letters are usually made from a white metal, because they are softer and more pliable than the darker metals. It is customary to use bronze molds for this purpose, and the whole alphabet are cast at one time, and also the numbers 1 to 9 and 0, so that any required combination of numbers may be obtained. The mould is made from one-piece casting with a long gate to give the required pressure to the metal when pouring. The back of the mould consists of common wrapping paper smoked and fastened to a very smooth piece of hard wood and clamped to the metal side while pouring the metal in the mold. This leaves one side of the letters perfectly flat and even. The formula that gives the best result for this class of work is:

Tin	7 lbs.
Lead	7 lbs.
Antimony	2 lbs.

This mixture runs clean and sharp, and can be easily melted in an iron kettle.—C. H. P.

CEMENTING

Q.—Will you kindly inform me if there is a cement or glue or some such solution that will hold wood on iron permanently?

A.—Litharge and glycerine cement unites iron and wood very firmly. Use about 2¾ pounds of very fine litharge to 1 pound of concentrated glycerine.—J. L. J.

CLEANING

Q.—Can you tell me the best way to clean the inside of britannia ware, so that it can be plated white?

A.—We would advise you to clean your britannia ware by means of what is known as the cup brush, using carbonate of soda and pumice stone. This will clean the inside sufficiently to allow the plate to adhere.—K.

COLORING

Q.—I am sending you a key finished in dark brown which I would like to duplicate.

A.—The dark brown color, the same as upon your sample key submitted to us for examination, may be produced in the following manner:

Dissolve ½ ounce red sulphide of antimony and 4 ounces caustic soda in 1 gallon of hot water. Polish your keys down to a flour emory finish so that they will not have too much luster. Then cleanse in the usual manner and immerse in the bronze dip for a few seconds until a very dark brown is procured. Then remove, wash, dry out in sawdust in the regular manner and bring out the color by lightly scratch brushing with a very soft or much-worn brass scratch brush. This brushing should be done dry. We are sending you with your sample a brass key finished in our laboratory in the manner mentioned.

C. H. P.

Q.—Can you send us a formula for putting a steel blue color upon brass?

A.—The usual formula for producing a blue color upon brass is:

Hyposulphite of soda.....	4 ozs.
Acetate of lead.....	2 ozs.
Water	1 gal.

The solution is used hot.—C. H. P.

CRYSTALIZING

Q.—Our nickel solution stands 8 degs. Be. The nickel crystalizes on the anodes and on sides and edges of tub. Can you suggest a remedy?

A.—If there is nothing more serious the matter with your nickel plating solution than the crystalizing out of the nickel salts, a little water added to reduce the density so that the solution registers between 6 and 8 degs. Be., will dissolve the crystals and prevent the forming of same, of course there is a certain amount of loss due to evaporation in a plating solution, causing the density of the solution to increase and the nickel salts will crystalize out. If it is found that after adding the water that the solution does not plate as readily as before, add single nickel salts to the amount of one ounce per gallon of solution in the tank.—C. H. P.

FINISHING

Q.—Will you publish a method of treating articles finished in verde green so that the coat will not rub off?

A.—After producing the patina or verde green the articles

are allowed to dry in the air. They are afterwards lacquered with a semi-transparent dip lacquer thinned with benzine or gasoline, to produce an opaque appearance. The lacquer should dry without heat for several hours. The articles can be readily waxed, when the appearance you desire will be obtained.—C. H. P.

Q.—Would you please tell us how the finish on the enclosed sample is produced without a sand blast, and what the finish is called?

A.—This finish is sometimes called antique brass, old brass, or Flemish brass. When of cast brass the surface is sandblasted, cleansed and immersed in a solution consisting of:

Muriatic Acid	1 Pint.
Arsenic, Powdered	1 Oz.
Water	1 Gal.

The solution is used hot. This dip gives a steel appearance. The surface is then scoured off, using a brass scratch brush and a little pumice stone for the purpose, dried out, and if too light in color run through a very weak and cold mixture made up with about one-fourth the amount as specified, then washed, dried and lacquered. Without sandblasting, a swing brush may be used for the satin finish, or the surface as it comes from the mold may be used in the place of sandblasting.—C. H. P.

Q.—Will you please publish a formula for green oxidized solution for silver?

A.—You cannot produce a green oxidize upon silver directly. You would first have to produce a copper deposit upon the surface, because silver does not produce patina greens the same as copper or bronze. The best method for you to pursue would be to first lacquer the articles in the usual manner, then dissolve some aniline green and a small portion of aniline yellow in fusel oil, according to the time required. Then go over the lacquered surface with the green, using a regular lacquer brush. Allow to dry for a few minutes and relieve the high lights with soft white rags that may be moistened with the fusel oil.

Another method that gives excellent results is to mix up dry chrome green and white lead (ground in linseed oil) in turpentine and add a small amount of turpentine copal varnish or hard oil finish as a binder. When mixed up thoroughly, according to the tone of green required, apply with a fitch varnish brush evenly and allow to dry for a short time. Then relieve the high lights with a mixture of 1 part turpentine and 2 parts boiled linseed oil, using rags or cheese-cloth for this purpose. When the articles are finished properly these methods give good results.—C. H. P.

FLUXING

Q.—What flux (or other means) do refiners use when preparing silver anodes so that the anodes will wear white all through and never give a powdery deposit or show a milkiness in the solution should the sheet be disturbed or lifted

A.—The best flux to use when melting fine silver for anodes, if the silver is in a metallic state, is:

Carbonate of soda.....	2 parts.
Borax	1 part.
Fine silver	20 parts.

If the silver is in the form of chloride, the best flux is:

Carbonate of soda	10 parts.
Borax	2 parts.
Dry chloride of silver.....	2 parts.

In using the above fluxes the molten mass must be repeatedly stirred with a clean rod of iron or a stick of carbon until all the carbonic acid gas has escaped, and the mass is in quiet fusion. As soon as the surface becomes placid the melt should be poured immediately in iron molds that have been well smoked or brushed with graphite.

An analysis of a part of each anode sent here showed the composition of both to be identical (fine silver). By tearing the rough one and making a microscopical examination of the edge the metal was seen to be full of gas holes, and that, coupled with the fact that the yellow flame test made it as brittle as mica, shows the silver was much too hot when poured or the molten mass held a large amount of gas. A powdery deposit denotes an improperly made solution or the use of too high a voltage, and should never be blamed on the anode.—O. A. H.

MANUFACTURING

Q.—Is there any advantage in preparing a silver bath in using muriatic acid instead of salt?

A.—In preparing chloride of silver from nitrate of silver very little difference will result from the use of common salt or muriatic acid. They both contain chlorine, which is the agent that produces the chloride. Of the two methods the muriatic acid gives the best results, as no nitrate of soda is then formed, which is a neutral salt and does not show by litmus test. In precipitating the silver nitrate as a chloride with the muriatic acid, dissolve the silver in the usual manner, then add water. The muriatic acid is then added as long as a precipitate results. Afterwards wash the precipitate until free from the acid in the usual manner.—C. H. P.

Q.—Could you give me a formula for making brass polish in liquid form?

A.—Liquid metal polishes depend largely upon the amount of stearic or oleic acid they contain, with other ingredients, such as naphtha, whiting, silicia or kiselghur (an infusoreal earth). If a non-inflammable or non-explosive liquid polish is desired, then instead of using gasoline or naphtha, carbon tetrachloride can be used, which gives the same results and is non-explosive. The following proportions, with a little variation, may produce excellent results:

Crude oleic or stearic acid	16 lbs.
Kisselghur or silicia, or a mixture of these..	55 lbs.....
Carbon tetra chloride or naphtha	4 lbs.
Oil of mirbane or citronella	1 oz.

Aniline red or jewelers' rouge for color effect sufficient for the purpose. If aniline color is used first dissolve the aniline in denatured alcohol; very little is needed for coloring effect. The jeweler's rouge, or oxide of iron, can be added with the other material; ¼ to ½ ounce will prove sufficient.—C. H. P.

MIXING

Q.—We want very much to secure the recipe for a non-shrinking metal, to be used in duplicating patterns, and would appreciate very much your publishing such a recipe in your paper at an early date.

A.—The following mixture is a very satisfactory one for duplicating patterns:

Tin	50 lbs.
Zinc	50 lbs.

This gives a tough, hard metal that runs well if a good grade of zinc is used. The addition of 2 pounds of bismuth will render it even more fluid and enable it to be poured at a lower temperature. By using heavy sprues and pouring cold the shrinkage, which is slight, may be largely overcome.—J. L. J.

PLATING

Q.—We are having some trouble in copper-plating zinc sheets, running in size from 2 by 4 to 2 by 8 feet. Kindly advise us of best formula to use.

A.—For successful results in copper-plating zinc sheet use a warm solution consisting of the following:

Cyanide of potassium.....	6 ozs.
Regular copper compound.....	2 ozs.
Bisulphite of soda.....	2 ozs.
Water	1 gal.

Use soft sheet copper for anodes, a current strength of 3½ to 4½ volts. A fairly good deposit should be obtained in one-half hour. The blistering results from either too strong a current or too much cyanide. Your present solution might be used satisfactorily if you reduce it with water to 10 degrees, then add 2 ounces bisulphite of soda to each gallon and run at a temperature of 120 degrees. Carbonate of copper can be used in the place of the red copper compound, but use 3 ounces instead of 2 ounces.—C. H. P.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

A NEW AUTOMATIC ANNEALING AND HARDENING FURNACE.

An improved form of the internally-fired rotary annealing furnace is shown here in Fig. 1. When this furnace was first developed it relied on the deep helical channels with spiral separating walls for forcing the material forward. It was found, however, that while this was very successful for light smooth pieces such as lock washers, balls, etc., and is still spirally lined for this class of work, but it was found to be unsuitable for long pieces, such as bolts, rivets, etc., and irregular shaped steel punchings, forgings, castings, etc., and other methods of feeding the material through the furnace were required.

In the present type of furnace, for smooth or round work the rotating cylinder or drum is lined with a standard refractory hard brick, with a smooth internal surface, Fig. 2. The furnace is mounted in such a manner that its axis may be tilted at an angle giving the revolving hearth an incline with the discharge end lower than the entrance or feed end. The gradual incline causes the material to feed forward, and by means of a hand wheel the degree of pitch may be adjusted so as to regulate the progression of the material through the furnace and consequently the time of heating.

The advantages of this method of automatic continuous heating are many, the material is charged in a hopper in bulk at the exhaust end of the furnace and fed automatically into the chamber, the material comes continually in contact with the newly-heated surface of the chamber which is revolving, thereby absorbing the heat from the lining as well as from the heated gases. In a stationary furnace the heat from the sides and roof is not utilized, as the material remains in a fixed position, that farthest removed from the heat requires a much longer period to be brought to the desired temperature and the more exposed pieces are liable to overheating, others insufficiently heated and a much longer time required.

Tests of material being heated and hardened in the internally fired rotary furnace at the rate of 2,000 pounds per hour have failed to show the slightest variation—with a pyrometer to insure the proper temperature and the chamber tilted to feed at the proper speed the product must be absolutely uniform. In operation, the pieces are fed continuously into one end of the cylinder. The furnace is fired internally from the opposite end with the zone of highest temperature at the discharge end. The cylinder revolves slowly (1 to 4 revolutions per minute) and owing to the slight inclination of the furnace the pieces treated fall slightly forward at each revolution, gradually progressing toward the discharge end, where they enter a proper receptacle or bath upon reaching the desired temperature.

To prevent oxidization, the end of the charge spout may be carried beneath the level of the bath, thereby sealing it and excluding the air. By this method, clogging or retardation of

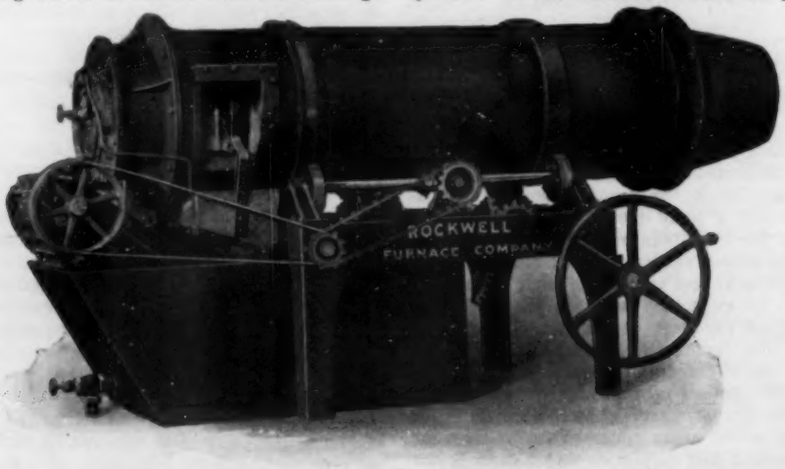


FIG. 1. ADJUSTABLE AUTOMATIC ANNEALING AND HARDENING FURNACE.

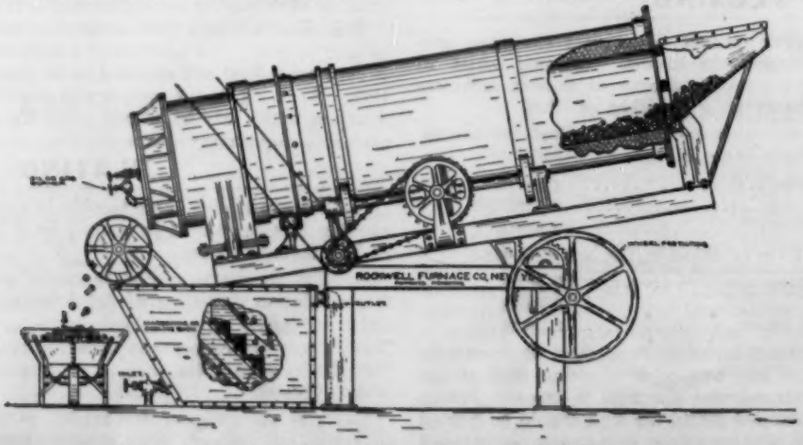


FIG. 2. ADJUSTABLE INCLINED TYPE WITH PLAIN LINING.

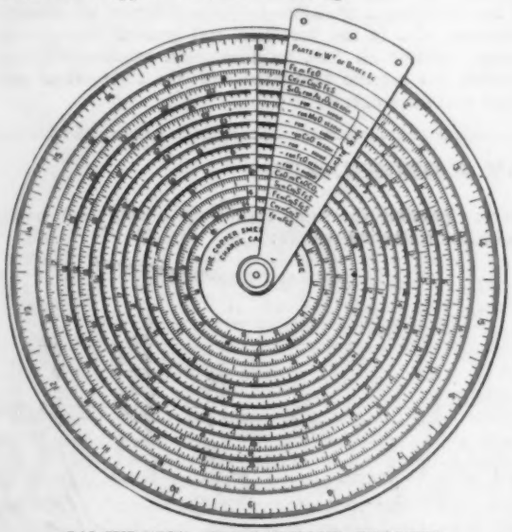
the work is avoided, as there are no corners or pockets in which the pieces can lodge. Wear of the lining is reduced to a minimum and does not require renewal until the greater portion of the brick is worn away. In certain classes of work, such as balls, nuts and uniform shapes, the helical or worm type is used, and this furnace may be lined either way, as preferred, but where the smooth lining can be used the cost is less and a greater life insured.

Oil or gas fuel may be used, and perfectly uniform results obtained, as the work treated is heated gradually with every portion of its surface exposed to the direct action of the hot gases and lining, and both temperature and time are maintained constant.

These furnaces are manufactured by the Rockwell Furnace Company, 26 Cortlandt street, New York, and are built to suit a wide range of requirements, and in sizes at present that will handle up to 2,000 pounds of stock per hour.

A CALCULATOR FOR RAPID DETERMINATION OF FURNACE CHARGES.

We have had recently brought to our notice one of the most ingenious and useful applications of the slide rule it has been our fortune to see. It is also as simple as it is ingenious. The arranger of it is Mr. Robt. Marshall, a mining and mechanical engineer, and the object of the rule is the making of blast furnace calculations for copper and matte smelting.



CALCULATOR FOR FURNACE CHARGES.

The rule in question is circular and it contains logarithmic and percentage scales on the two faces. The disc is about nine inches diameter and carries on one face a smaller circular 7½-inch disc, and there are two sliders which take the place of the cursor in the ordinary straight rule. It carries an ordinary logarithmic scale round its edge similar to the scale over which this edge runs on the main disc. This scale is about 23 inches long. One is called the inner circle or revolving scale, and the other is called the outer circle. Outside the outer circle is a concentric circumference of 1,000 divisions. The moving and fixed scales are used just as the two scales of the common straight slide.

The equal divisions of the circumference thus becomes the logarithms of the numbers radially opposite to them on the fixed logarithmic scale. As to the two revolving sectors each carries a radial line which can be set over any mark on the circle, and by means of a clamping screw, the sectors can be revolved together, whereby addition, subtraction, multiplication and division can be performed, or numbers can be raised to their powers and the answer read off in numbers, or by looking for the number on the circumference the log can be read off. On the other face of the disc as shown, there are a number of circles of equal divisions which come under parts of the sector or cursor on the face of the disc, on which are engraved under the heading of Parts by Weight of Brasses, etc., the chemical formulae of the various compounds met with by the copper smelter. The circles show the parts by weight of bases when the edge of this sector is set on the outer circle against the percentage of the oxide or sulphide in the ore to be treated.

A pamphlet which accompanies the calculator gives examples of calculation, so that having the analysis of the ore a few minutes will serve to determine the weights of all the parts in a given weight of ore, and the amount of flux to be used. The coke is similarly dealt with and by this instrument can be at once determined the necessary materials.

Just what slag the furnace man will aim at is a matter for his own judgment and knowledge. If he knows what he wants this calculator will put him on the short road to getting it, and to getting it accurately, for upon accuracy depends very largely the recovery percentage possible to be secured and the ease of working.

The instrument is difficult to describe, but it is easy to use, and every copper smelter ought to possess one. Even if able to work out the various weights the furnace man will find the rapidity and accuracy of the rule valuable in securing the best results.

Additional information regarding the calculator may be had by addressing THE METAL INDUSTRY, 33 Bedford street, Strand, London, W. C.

A NEW SOLDER FOR ALUMINUM.

SOME INTERESTING RESULTS FROM THIS MATERIAL.

Of the problems that have confronted metallurgists and metal workers for the past 20 years there has been none that seemed less likely of solution than that of a good reliable solder for aluminum. A great number of mixtures have been suggested and a great deal of money has been expended in experimental and investigation work. Up to the present time, however, the success of these solders with a few notable exceptions, has been indifferent. Among the exceptions there is one now being extensively used, which according to the claims and guarantees made by its inventor leads all the others.

This solder is known as the Hartman Aluminum Solder and is manufactured, used and sold by the Hartman Aluminum Solder Company of 134 West 49th street, New York. We publish herewith a report of resistance and tensile tests made on this product by the Electrical Testing Laboratories, Eightieth street and East End avenue, New York.

TENSILE TESTS.

No.	Average Cross Section, Square Inch	Breaking Stress. Pounds Total.	Pound per Sq. In.
"Wrought"	0.138	1373	9950

Broke in jaw. Another test was made on remaining piece, as follows:

"Wrought"	0.138	1361	9850

Rupture occurred just outside of jaw. There was no tendency to rupture at the joint.

RESISTANCE MEASUREMENTS.

Sample. No.	Cross Section Square Inch.	Current Amperes.	Resistance of 2" *Length Microhms.* Left side of Joint.	Across Joint.	Right side of Joint.
"Wrought"	0.1381	25	22.4	22.2	22.3
	0.1382	50	23.0	22.8	22.9
	0.1282	75	24.6	24.1	24.3
"Wrought"	0.4386	80	0.575	0.575	0.575
	0.4286	160	0.618	0.618	0.618
	0.4286	200	0.662	0.662	0.662

NOTE.—The largest current in each case caused the sample to heat to about 60° to 70° C.

CONCLUSIONS.

The above results indicate that the resistance of the joint is practically the same as that of the solid metal. The measure-

ments of the resistance of the latter on the two sides of the joint show as much of a variation between themselves as is shown between the section including the joint and an equal section of the solid metal.

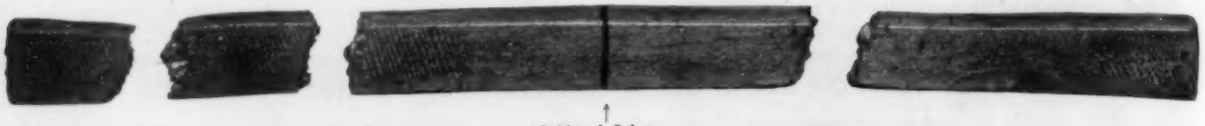
It will also be noted that the effect of heating on the resistance due to excessive current is the same on the joint as on the solid metals.

The tensile strength of the joint in the wrought sample showed a tensile strength fully equal to that of the material itself.

Approved by:

F. M. FARMER,
Engineer.

A. H. BRYANT,
In charge of test.



RESULTS OF RESISTANCE AND TENSILE TESTS ON HARTMAN SOLDER.

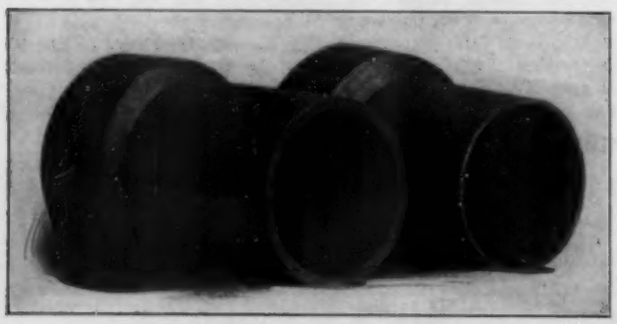
The cut shows the soldered piece of aluminum that the test was made on and the figures show the order in which the ruptures occurred.

One of the most important features of the solder is the absence of zinc in its composition, thus making it immune from the action of salt water. It therefore can be employed for use in marine work with impunity. The solder is also used without a flux of any sort. The Hartman solder was invented by Gustave Hartman, an Hungarian metallurgist and inventor of considerable prominence, who is the president and general manager of the company. Arthur H. Ash, an automobile engineer of 12 years' experience, has become associated with the company as assistant manager and sales agent.

REMARKABLE RESULTS FROM A DEOXIDIZER.

The accompanying photograph shows the results produced by a compound called homogen, manufactured by The Allyne Brass Foundry Company at their Cleveland, Ohio, plant. These bushings were cast from the same metal, scrap red brass. One hundred pounds were first melted and poured into ingots. This gave, as near as it is possible to get, the same metal in each ingot. The ingots were then divided into two lots of fifty pounds each, which were re-melted. In one lot homogen was used and the other lot was melted in the ordinary way, the conditions, temperature, etc., being identical.

They were then machined for a hydrostatic test, the inside skin being removed. They both stood the test of 1,000 pounds pressure. They were next put on a lathe and 1-32 taken off from the outside. They were then put back on the pump and this process was continued until the castings leaked or sweated. The photo shows the results, the exact thickness of the walls when the test was completed being: The casting without homogen leaked with walls 1/8 of an inch in thickness, while the one treated with homogen did not leak until the walls were reduced to a thickness of 1-16 of an inch. Cold water was used and the pressure was 1,000 pounds in each test.



SHOWING RESULTS OF HOMOGEN.

The above test was also made with yellow brass scrap and virgin metal, both red and yellow, a number of standard formulas being used. The results were in proportion to those given. In a circular which they are sending to the trade appears a very interesting statement regarding iron and steel that appears in turnings, scrap, etc. It is claimed that homogen causes the iron to become homogenous with the mix, and that the iron does not in any way affect the machining qualities of the casting. The only effect caused by iron is a discoloration, but this is not noticeable where the usual amount of iron appears.

Some comparative tests made with and without homogen are given below. In each test 100 pounds of metal were melted and poured into ingots, thus insuring a uniform metal. Fifty pounds were then remelted with homogen and fifty without, maintaining as near as possible the same conditions during each and every test, with the following results:

MANGANESE BRONZE.

	Tensile strength per sq. inch.	Increased strength per sq. inch by using Homogen.	Per cent. elongation in 2 inches.	Per cent. reduction.
Treated with homogen.....	70,300	6,500	22.½	21.
Without homogen	64,800		12.½	17.

U. S. GOVERNMENT STANDARD.

88-10 and 2

Treated with homogen.....	41,200	3,400	15.½	16.8
Without homogen	37,800		10.	11.

RED BRASS VIRGIN METAL.

Treated with homogen.....	34,950	3,300	43.5	35.
Without homogen	31,650		36.	31.

RED BRASS SCRAP.

Treated with homogen.....	26,950	2,550	11.	6.
Without homogen	24,400		7.½	4.

YELLOW BRASS VIRGIN METAL.

Treated with homogen.....	32,900	2,800	46.½	40.
Without homogen	30,100		35.½	31.

YELLOW BRASS SCRAP.

Treated with homogen.....	25,750	3,450	21.½	21.
Without homogen	22,300		12.½	13.

"Homogen" is the only alloy for removing impurities which is used by introducing it into the pot before the metal is melted. It melts down with the metal; the chemicals leave the brass filings at the same temperature at which copper melts and by working through the molten mass exerts a chemical action on the various impurities which causes them to be consumed, leaving the weight of the carrier or brass filings added to your metal.

All metals, whether virgin or scrap, contain impurities. The more impurities, the more pronounced the bad effect of any imperfect moulding conditions. As "Homogen" removes the impurites, it also, to a large extent, overcomes the bad effect of imperfect melting or moulding conditions.

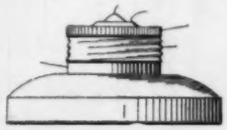
The benefits to be derived from "Homogen" are therefore; it increases the tensile strength, elongation, elasticity, fluidity and density. It prevents sponginess, blow holes and porousness, and removes the natural and acquired impurities from all metals with a copper base.

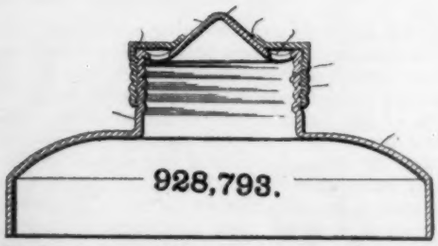
PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

928,793. July 20, 1909. Box Top. Walter H. Perkins, Cheshire, Conn., assignor to Waterbury Manufacturing Company, Waterbury, Conn.

This invention as shown in cut relates to an improvement in box tops, and by the term "box" as herein used refers to boxes such as are used for tooth powder or toilet powder, or in the

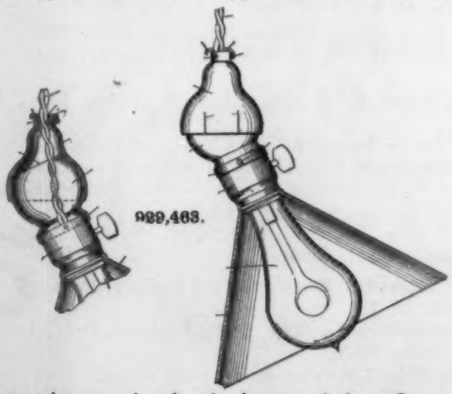




form of bottles for containing toilet preparations, either liquid or powder, or for any other purpose in which it is desired to provide a top which may be opened to permit the contents to escape, the object being to provide a suitable top for cans or boxes or bottles which may be readily closed or opened, and which, when closed, will prevent the escape of the contents, and which, when open, will permit the ready escape of the contents.

929,463. July 27, 1909. Electric Lamp Socket. James McGavin, Springfield, Ill.

This invention, shown in cut, relates to electric lamp sockets, the object of the invention being to provide a supplemental or auxiliary lamp socket which is applicable to the usual sockets of

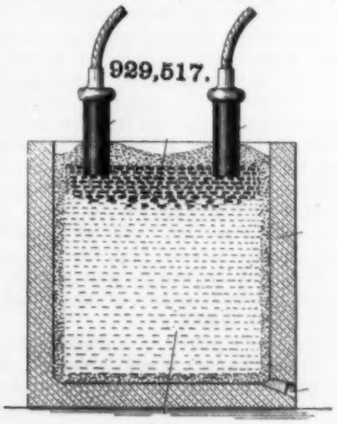


incandescent lamps, whereby the lamp and the reflector attached thereto may be adjusted to any desired angle with relation to the supporting wire or conductor, thereby making the lamp as a whole much more effective and salable without adding but a trifle to the original cost thereof.

929,517. July 27, 1909. Method of Treating Aluminum Ores. Frank J. Tone, Niagara Falls, N. Y., assignor to the Carborundum Company, New York.

This is an apparatus designed (see cut) to reduce the oxide of the metals present other than alumina, and finally to separate the alumina from the reduced metallic compounds.

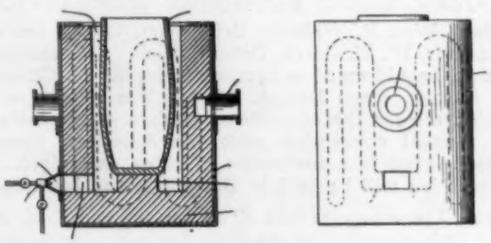
For carrying out the process in its preferred form, the mixture is made of aluminum silicate, pulverized emery and carbon, the carbon being present in an amount sufficient to reduce all the oxides other than alumina, but insufficient to reduce the alumina. The mass of mixture is then placed between the electrode terminals of an electric furnace and current is passed through



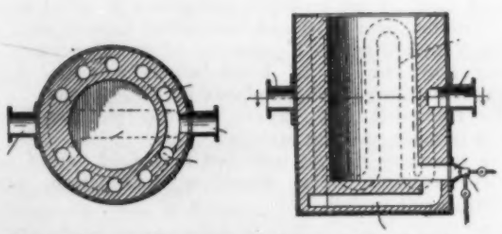
it. As the heating of the mass progresses and it becomes partially fused its conductivity increases, and when it reaches a well-fused condition, the charge becomes a good conductor of the electricity. The current in passing through this mixture generates heat and the furnace operates as a simple resistance furnace, the resistance conductor being the fused charge.

929,831. August 3, 1909. Melting Apparatus. William M. Carr, New York, N. Y., assignor of one-half to Charles H. Speer, Chester, Pa.

The disadvantages of the ordinary forms of melting apparatus are obviated in this invention. As shown in cut, the apparatus consists of a combination of crucible and furnace which forms



929,831.



a relatively small portable structure from which, if it is desired, the molten materials may be poured directly without exposure of the melting vessel to air. To this end, the melting vessel proper, which may be of any suitable refractory material, such as plumbago, fire clay, etc., is mounted in and inclosed by a suitable casing of refractory material, such as ordinary fireclay,

etc., leaving an annular, comparatively narrow unobstructed passageway therebetween to serve as a flame chamber.

The apparatus is particularly adapted for melting copper, brass and other high-melting materials, but may be used for other purposes. In melting and casting metals, it is obvious that the apparatus is at once crucible, furnace and ladle.

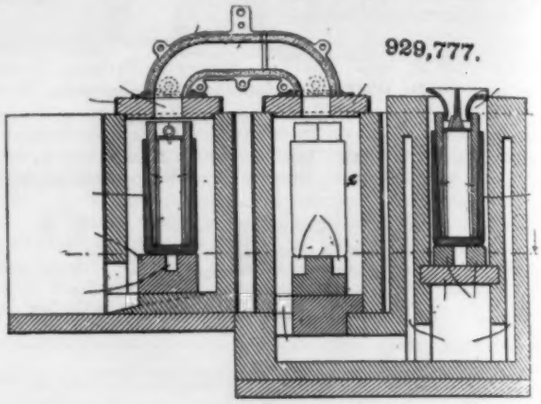
929,777. August 3, 1909. Process of Producing Coated Metal Objects. John F. Monnot, New York, assignor to Duplex Metals Company, New York.

A process of producing ingots and like bodies of coated metals, and more particularly a process of producing clad metals, by which term is meant bodies comprising a core or base of one metal (iron or steel for instance), having united thereto, and preferably inseparably united or welded therein, a substantial coating or layer of an unlike metal (for instance, copper, silver, gold, aluminum, brass, bronze, aluminum bronze, etc).

According to the present process, as shown in cut, the molten metal is caused to pass through a layer of wiping liquid, as it is cast, and thereby all entrained gases, superficial oxid, etc., are removed from such cast metal, and it is caused to solidify in a condition of exceptional purity and freedom from bubbles, blowholes, and occluded gases, as a dense, tough and fine-grained metal. The base or object to be coated is also, preferably, immersed in this "wiping liquid," and is thereby protected from oxidation or contamination; said liquid being displaced from around said base, by the molten metal as it rises in the mold, so that intimate contact occurs between an absolutely clean surface of said base and absolutely clean molten coating metal, entirely without intermediate contact of air or other contaminating or chemically active media.

The core or base to be coated is commonly heated to a high temperature before the molten metal is caused to contact with its surface; and preferably this heating is conducted by placing the said core or base in the mold in which the casting is to be done, said mold containing a sufficient quantity of said wiping material (either solid or molten) to completely submerge said base, and then the mold is placed in a suitable heating furnace (if not already in such furnace) and heated therein to the desired temperature, the enveloping body of wiping material (which, if not already molten, melts in the furnace), preventing contact of air or furnace gases with the surface of said core or base and so preventing contamination thereof.

This wiping material may be entirely neutral as regards the metal of the core or base or oxids and other coatings formed



thereon by the action of contaminating agents, or it may have more or less cleansing or solvent power. Sodium silicate (water glass) is one suitable wiping material which may be used. This material, placed solid in the mold, soon melts under the action of the heat of the furnace, but seems to have comparatively little solvent power for oxid coatings on iron or steel; such solvent action not being required if the surface or the iron or steel base or core be carefully cleaned, as should be the case, before said core or base is placed in the mold. If greater solvent action as regards oxid or other contaminating coating is desired borax may be added in greater or lesser quantity to the sodium silicate.

Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION.

President, Wm. R. Webster, Bridgeport, Conn.; Secretary and Treasurer, W. M. Corse, Detroit, Mich. All correspondence should be addressed to the Secretary, W. M. Corse, 123 Palmer Avenue, East, Detroit, Mich. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities, as invited. The next convention will be held in Detroit, Mich., June, 1910.

Secretary Corse reports that F. N. Perkins and C. E. Hoyt, president and secretary of the Foundry and Manufacturers' Association were recently in Detroit, and went over the arrangements for the convention there of 1910 with a great deal of care. They reported everything in good shape, and are planning for a large and interesting exhibit next year.

The Standardization Committee of the association is preparing two samples of brass which will be distributed through the Bureau of Standards in Washington.

The Committee on Papers reports two excellent ones, with a number more in sight.

The secretary has jst prepared a revised list of members of the American Brass Founders' Association, which we herewith print in full.

LIST OF MEMBERS.

Abate, W. L., Genl. Supt. Nathan Mfg. Co., 416 E. 106th St., New York, N. Y.

Adams & Westlake Co., Ward W. Willits, Pres., 110 Ontario St., Chicago, Ill.

Ajax Metal Co., 46 Richmond St., Philadelphia, Pa.

Allan, Andrew, Jr., A. Allan & Son, 486 Greenwich St., New York, N. Y.

Allan, Percy, Sec'y Jenkins Mfg. Co., Bloomfield, N. J.

Allen, Wm. D., W. D. Allen Mfg. Co., 151 Lake St., Chicago, Ill.

Allyne Brass Fdry. Co., Chas. B. Bohn, Mgr., Detroit, Mich.

Allyne Brass Foundry Co., Cleveland, Ohio.

American Car & Ship H'dwe Mfg. Co., New Castle, Pa.

Antisell, F. L., Raritan Copper Works, Perth Amboy, N. J.

Arcade Mfg. Co., Freeport, Ill.

Ashcroft Mfg. Co., F. C. Blanchard, Works Mgr., East Side Station, Bridgeport, Conn.

Barnett Fdry. Co., Oscar, Gerald Hainay, Treas., P. O. Box 24, Newark, N. J.

Bay State Brass Co., The, C. K. Sanborn, Pres., 150 Nassau St., New York, N. Y.

Belknap Mfg. Co., The, Bridgeport, Conn.

Bell, Wm. H., Foreman G. N. Ry. Brass Fdry., 281 La Fond St., St. Paul, Minn.

Berliner, H. E., 319 E. 51st St., New York City.

Besly, Chas. H. Co., 15 S. Clinton St., Chicago, Ill.

Best, Wm. Newton, 229 Ryerson St., New York, N. Y.

Bettendorf Axle Co., Davenport, Iowa.

Birkenstein, S. & Sons, 64 Ontario St., Chicago, Ill.

Brady Brass Co., D. M. Brady, Pres., 95 Liberty St., New York, N. Y.

Braidwood, A., 59 Pleasant St., Bridgeport, Conn.

Brass Founders' Supply Co., Stockton G. Barnett, 20-34 Prospect St., Newark, N. J.

Brazier, John B., Mgr. Powhatan Brass & Iron Works, Charlestown, W. Va.
Bridgeport Deoxidized Bronze & Metal Co., Chas. N. Choate, Mgr., Bridgeport, Conn.
Buckeye Products Co., 2306 Eastern Ave., Cincinnati, O.

Cadillac Motor Car Co., J. J. Wilson, Fdry. Supt., Detroit, Mich.
Cadman Mfg. Co., A. W., 2814 Smallman St., Pittsburgh, Pa.
Caley, Chas. J., Genl. Mgr. Russell & Erwin Mfg. Co., New Britain, Conn.
Callender, Jas. H., Arlington, N. J.
Carborundum Co., The, Niagara Falls, N. Y.
Cardwell, I. A., 708 So. Main St., Fitzgerald, Ga.
Carolin, R. B., Clayton & Lambert Mfg. Co., Detroit, Mich.
Carpenter, Wm. H., Genl. Mgr., Metal Dross Economy Co., Bristol, Conn.
Carter, J. N., 1946 Wolf St., Philadelphia, Pa.
Chapman, J. B. & Co., Springfield, Mass.
Cleal, Joseph P., 126 Wellington St., W., Toronto Can.
Climax Specialty Co., J. C. Davis, Pres., Seneca Falls, N. Y.
Clum & Atkinson, 575 Lyell Ave., Rochester, N. Y.
Coleman, F. A., J. D. Smith Fdry. Supply Co., 1846 Scranton Road, Cleveland, O.
Comstock, Frank, Norwalk Brass Co., Norwalk, Conn.
Comstock, C. W., Caxton Bldg., Cleveland, O.
Condit, John A., Jos. Dixon Crucible Co., Jersey City, N. J.
Cope, L. R., 215 Edgewood Ave., Dayton, O.
Corbin, P. & F., Chas. H. Parsons, V. P., New Britain, Conn.
Cope, P. P., 215 Edgewood Ave., Dayton, O.
City Brass Foundry Co., Geo. Hammink, 5310 St. Clair Ave., Cleveland, O.
Craig, J. M., Brass Founder, 71 Arch St., Hartford, Conn.
Cramp Ship & Engine Bldg. Co., Wm., Philadelphia, Pa.
Crescent Mfg. Co., F. L. Brown, Mgr., Scottdale, Pa.

Damascus Bronze Co., South Ave and Sturgeon St., Allegheny, Pa.
Detroit Lubricator Co., Detroit, Mich.
Dings Electro Magnetic Separator Co., 675 Smith St., Milwaukee, Wis.
Dixon Crucible Co., Jos., Jersey City, N. J.
Doeright, G. A., Pres. & Genl. Mgr. The Falcon Bronze Co., Youngstown, O.
Donald Sales Co., Henry R., H. R. Donald, Mgr., 285 Oregon St., Milwaukee, Wis.
Dreyfus, Harry, Nassau Smelting & Refining Co., 29th St. and 11th Ave., New York, N. Y.
Duffy, Philip, P. O. Box 817, Lockport, Ill.
Detroit Testing Laboratory, 1111 Union Trust Bldg., Detroit, Much.
Doggett, Stanley, 101 Beekman St., New York, N. Y.

Eclipse Foundry Co., P. O. Box 82, Detroit, Mich.
Empire Mfg. Co., T. A. Stevens, Pres., London, Ont., Can.
Evans, Thos., Treas. Eynon-Evans Mfg. Co., 15th & Clearfield Sts., Philadelphia, Pa.
Elijer Co., O. J. Backus, Cameron, W. Va.

Ford, Allan P., Eaton, Cole & Burnham Co., Bridgeport, Conn.
Foundry, The, A. O. Backert, Editor, Cleveland, O.
Freysinger, John, B., Winchester, Repeating Arms Co., 550 Dixwell Ave., New Haven, Conn.
Ferry, Chas., Bridgeport Brass Co., Bridgeport, Conn.
Frontier Brass Foundry, Whitney Ave., Niagara Falls, N. Y.
Fulton, F. H., 1108 So. Lafayette St., South Bend, Ind.

Gamble, J. N., National Tube Co., Kewanee Works, Kewanee, Ill.
Gautier, J. H. & Co., David R. Daily, V. P., Jersey City, N. J.
General Fire Extinguisher Co., Russell Grinnell, V. P., Providence, R. I.
Gordon, J. R., Arlington, N. J.
Great Western Smelting & Refining Co., 179 W. Kinzie St., Chicago, Ill.
Grimshaw, Fredk., North East Pa.
Gutsche, J. A., 682 E. 102d St., Cleveland, O.

Genesee Metal Co., F. W. Reidenbach, Genl. Mgr., Rochester, N. Y.
Goss, Edward O., 90 Pine St., Waterbury, Conn.
Goss, Chauncey P., Jr., 65 N. Willow St., Waterbury, Conn.

Haasis, A. L., Jos. Dixon Crucible Co., Jersey City, N. J.
Haines, Jones & Cadbury, Inc., Jos. W. Sharp, Jr., V. P., 1136 Ridge Ave., Philadelphia, Pa.
Hanner, Edward, Mgr. Johnsonburg Machine Co., Johnsonburg, Pa.
Hartman, Wm. T., Supt. Messrs. P. & F. Corbin, New Britain, Conn.
Hoffman & Billings Mfg. Co., E. A. Neidecker, V. P., Milwaukee, Wis.
Homer Brass Works, Water and Miffley Sts., Philadelphia, Pa.
Hunt, David, Jr., c/o The Warner & Swesey Co., Cleveland, O.
Hazeltine, J. E., The Bashlin Co., Warren, Pa.
Harvey, C. F., A. Harvey Son's Mfg. Co., Detroit, Mich.
Hawley Down Draft Furnace Co., Chicago, Ill.
Hill & Griffith, Cincinnati, O.
Hillsbrand, Dr. W. F., Bureau of Standards, Washington, D. C.

Iron Age, 14-16 Park Place, New York, N. Y.

Johnson Service Co., W. L. Johnson, Milwaukee, Wis.

Kasjens, Jacob J., Brass Fdry. & Heating Co., Peoria, Ill.
Keating, Wm., 237 Lansdowne Ave., Toronto, Can.
Kelleway, Wm. S., Hub Fdry. & Plating Co., Ossining, N. Y.
Kinsley, Henry L., Mgr. N. Y. Office, Warner & Swasey Co., 149 Broadway, New York, N. Y.
Kinsey & Mahler Co., cor. Adams and Harrison Sts., Peoria, Ill.
Kerr Engine Co., Ltd., H. O. Kerr, Walkerville, Ont.

Landers, Frary & Clark, C. F. Smith, Pres., New Britain, Conn.
Lane, Henry M., 1924 Prospect Ave., Cleveland, O.
Lawrenceville Bronze Co., Edward Kerr, 31st & Penn Ave., Pittsburg, Pa.
Levett, Walker M., 464 10th Ave., New York, N. Y.
Little, Arthur D., Chemical Engineer, 93 Broad St., Boston, Mass.
Logan, John., National Cash Register Co., 1151 Wyoming St., Dayton, O.
Lonergan, John E., 211 Race St., Philadelphia, Pa.
Lumen Bearing Co., Wm. H. Barr, Treas., 1155 Sycamore St., Buffalo, N. Y.
Lymburner, H. N., Lymburner, Ltd., Co., Commissioners & Berri Sts., Montreal, Can.
Laugsenkamp, Wm., Jr., V.-Pres., Laugsenkamp-Wheeler Br. Works, 1220 Shelby St., Indianapolis, Ind.
Lunkenheimer Co., The, Cincinnati, O.

Mack, J. W., Secy. & Treas., Nathan Mfg. Co., P. O. Box 1688, New York, N. Y.
McConnell, D. A., Lovell McConnell Mfg. Co., 365 Market St., Newark, N. J.
McGarvey, Joseph, Asst. Supt. Speakman Supply & Pipe Co., Wilmington, Del.
McPhee, H., Edna S. & R. Co., Cincinnati, O.
Meadowcroft, J. R., Mgr. The Garth Co., 26 Craig St. W., Montreal, Can.
Merriam, Edmund A., Treas. Turner & Seymour Mfg. Co., Torrington, Conn.
Metal Industry, The, Palmer H. Langdon, 61 Beekman St., New York, N. Y.
Mitchell Co., The Robt., W. V. Shaw, Secy.-Treas., Montreal, Can.
Moldenke, Richard, Watchung, N. J.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Morrison Brass Mfg. Co., The Jas., Chas. E. Morrison, Secy.-Treas., 81 St. George St., Toronto, Can.
Moussette, O. J., Driggs Ave., cor. N. 10th St., Brooklyn, N. Y.
Mueller, Philip, H. Mueller Mfg. Co., Decatur, Ill.
Mumford Co., The E. H., 1223 Spring St., Philadelphia, Pa.

McRae & Roberts Co., Chas. A. Dobie, Detroit, Mich.
MacDonald, Albert, Supt. Metric Metal Works, Erie, Pa.
Marks, Geo. C., Supt. English & Mersick Lamp & Fdry. Co., New Haven, Conn.
Messmer Mfg. Co., Ferd F. Messmer, Jr., Pres., 2700 So. Seventh St., St. Louis, Mo.
Michigan Smelting & Refining Co., Ltd., 835 Superior St., Detroit, Mich.
Miller, John J., Canton Brass Co., Canton, O.
More-Jones Brass & Metal Co., Broadway and Dock Sts., St. Louis, Mo.
Murphy, M. F., Gen. Supervisor Foundries Amer. Locomotive Co., Schenectady, N. Y.
Muhlfeld, J. E., Supt. of Motive Power B. & O. R. R., 2214 Eutaw Place, Baltimore, Md.

Nathan, Alfred, P. O. Box 1688, New York, N. Y.
Neville, W. E., 1322 Callowhill St., Philadelphia, Pa.
North & Judd Mfg. Co., E. M. Wightman, Secy., New Britain, Conn.
New Departure Mfg. Co., Chas. T. Treadway, Treas., Bristol, Conn.
Nolte Brass Co., Foreman Chris. O'Connell, Springfield, O.
National Tube Co., Kewanee Works, Kewanee, Ill.
Newport News Shipbuilding & Dry Dock Co., W. A. Post, Gen., Mgr., Newport News, Va.

Oberdorfer Brass Co., Jonas L. Oberdorfer, P. O. Box 282, Syracuse, N. Y.
Ohio Brass Co., L. W. Olson, Supt., Mansfield, O.
Obermayer Co., The S., Cincinnati, O.
Osborn Mfg. Co., Cleveland, O.

Park, W. R., Supt. United Injector Co., 23 Watson St., Boston, Mass.
Patch, Nath, K. B., Mgr. Lumen Bearing Co., Toronto Jct., Can.
Peck Bros. & Co., New Haven, Conn.
Parmelee, H. C., 1510 Court Place, Denver, Col.
Paxson Co., The J. W., Philadelphia, Pa.
Penny, Edgar, Newburgh Ice Machine & Engine Co., Newburgh, N. Y.
Penberthy Injector Co., Detroit, Mich.
Pittsburg Brass Mfg. Co., Thos. Ward, Pres., 3155 Penn Ave., Pittsburg, Pa.
Pittsburg Meter Co., A. G. Holmes, Mgr., P. O. Box 52, E. Pittsburg, Pa.
Porter, W. A., Toronto, Can.
Powell Co., The Wm., Cincinnati, O.
Proctor, Chas. H., 621 Chestnut St., Arlington, N. J.
Pickins, E. L., Century Brass Mfg. Co., Cattaraugus, N. Y.
Progressive Metal & Refining Co., 55 Third St., Milwaukee, Wis.

Quigley, W. S., Rockwell Furnace Co., 26 Cortlandt St., New York, N. Y.

Regester, E. C., The Regester Co., Westminster, Md.
Reilly, Martin J., Franklin Brass Fdry., 100-102 Young St., Long Island City, N. Y.
Renneberg, Chas., McNab & Harlin Mfg. Co., Paterson, N. J.
Richardson, Edro, 318 N. Holliday St., Baltimore, Md.
Richards, Prof. W., Lehigh University, So. Bethlehem, Pa.
Richardson, Horace, Treas, Taunton Crucible Co., Taunton, Mass.
Roberts, Earl W., The Roberts Brass Mfg. Co., Detroit, Mich.
Ross-Tacony Crucible Co., Henry A. Ross, Tacony, Philadelphia, Pa.
Russell & Erwin Mfg. Co., I. D. Russell, Treas., New Britain, Conn.
Robertson Co., Ltd., The James, 144 William St., Montreal, Can.
Reubens, Chas. M., 68 Cliff St., New York City.

Schnell, Fred., 501 Fourth St., Buffalo, N. Y.
Schutz, F. H., H. Mueller Mfg. Co., Decatur, Ill.
Sharp, J. Cessna, Jno. C. Sharp Brass Works, Chattanooga, Tenn.
Sheeler, J. H., Sheeler, Hemsher Co., 811 Fairmount Ave., Philadelphia, Pa.
Smith, Wm. A., Atlas Brass Foundry, 112 Greenpoint Ave., Brooklyn, N. Y.
Scott, G. Shaw, Caxton House, Westminster, S. W., London, Eng.
Seidel, R. B., 1322 Callowhill St., Philadelphia, Pa.
Smith Foundry Supply Co., The J. D., Cleveland, O.
Speakman, Willard A., Speakman Supply & Pipe Co., Wilmington, Del.
Squires, J. D., Mgr. The Lyman Mfg. Co., Buffalo, N. Y.
Standard Sanitary Mfg. Co., Ahrens & Ott Works, Louisville, Ky.
Sterling Smelting Co., 48 Greenpoint Ave., Brooklyn, N. Y.
Southern Machinery Co., Atlanta, Ga.
Sperry, E. S., Drawer 137, Bridgeport, Conn.
Stevens, F. B., Larned and Third Sts., Detroit, Mich.
Stephenson, F. T. F., 469 Trumbull Ave., Detroit, Mich.

Tallman, A. H., J. N. Tallman & Sons, 72 Wellington St. N., Hamilton, Can.
Tampa Foundry & Machine Co., J. K. Merrin, Sec. Tampa, Fla.
Taylor, Uriah, Robt. Taylor & Son, Paterson, N. J.
Thompson, Hugh L., Waterbury, Conn.
Toothe, Edward S., Nathan Mfg. Co., 85 Liberty St., New York, N. Y.
Trenton Brass & Machine Co., W. H. Schulte, Mgr., Trenton, N. J.

Union Brass & Metal Mfg. Co., E. J. Seitz, Sec., St. Paul, Minn.
Union Equipment & Bronze Co., T. J. Norton, Pres., 1901 Park Ave., New York City.

Vulcan Louisville Smelting Co., Julius R. Kahn, First National Bank Bldg., Chicago, Ill.

Wakefield, F. W., Vermilion, O.
Walworth Mfg. Co., A. M. Mattice, Works Mgr., First & O Sts. So. Boston, Mass.
Warner, A. H., E. Stebbins Mfg. Co., Springfield, Mass.
Webster, Wm. R., Genl. Supt. Bridgeport Brass Co., Bridgeport, Conn.
Weising, Geo. F., Supt. Brass Dept., Sayre Stamping Co., Sayre, Pa.
Werra, C., Aluminum Foundry Co., Manitowoc, Wis.
Wetherill, S. P., Jr., Erie Ave., E. of Richmond St., Philadelphia, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.
Whitlock Coil Pipe Co., Chas. Gordose, Works Mgr., Hartford Conn.
Whitney, W. R., General Electric Co., Research Lab., Schenectady, N. Y.
Wilson, Wm. L., U. S. Aluminum Co., Pittsburg, Pa.
Wolff Mfg. Co., L., Harold Wolff, 93 W. Lake St., Chicago, Ill.
Wolverine Brass Works, L. A. Cornelius, Pres., Grand Rapids, Mich.
Woodbridge, Murray, Mgr. Gen. Brass Works, Ltd., 69 Sterling Road, Toronto, Can.
Yale & Towne Mfg. Co., W. C. Allen, Genl. Supt., Stamford, Conn.
Zeller, Frank, Rockwell Furnace Co., New York City.

INSTITUTE OF METALS.

President, Sir William White; Treasurer, Professor Turner; Secretary, G. Shaw Scott. All correspondence should be addressed to the Secretary, G. Shaw Scott, M. Sc., Institute of Metals, Caxton House, London, England. The objects of the Institute are for the educational welfare of the metal industry.

Secretary G. Shaw Scott under the date of August 7 has issued the following notice:

"In view of the recent large increase in the membership of the Institute of Metals, the council has decided to acquire more extensive offices. Immediately after the Manchester Meeting of the Institute, which will be held on October 14 and 15, a special room will be provided at Caxton House, London, to be used as

a members' room." The room will be comfortably furnished and will be provided with a supply of current technical literature, writing tables, etc. It is hoped that it will serve as a meeting and resting place for members when they are in London. The council has recently had under consideration arrangements for publishing abstracts, as a result of which the second volume of the journal, to be published in December or early in January next, will contain about one hundred pages of abstracts. These abstracts will be in addition to reports of the papers and discussions thereon.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA.

President, Chas. H. Proctor, Arlington, N. J.; Treasurer, Nathan E. Emery, New York, N. Y.; Secretary, Benj. W. Gilchrist, Woodhaven, N. Y. All correspondence should be addressed to the Secretary, Box 26, Woodhaven, Benj. W. Gilchrist, of the association N. Y. The objects dissemination of are to promote the ing the art of electro-deposition of metals in all its knowledge concern- first Saturday of each month, 8 p. m., at the Hotel Chelsea, 222 West Twenty-third street, New York City.

The seventh regular meeting was held September 3, 1909, at the Hotel Chelsea, 222 West Twenty-third street, New York, with twenty members present. It was decided to hold the monthly meetings on the first Saturday of each month, in order to allow out-of-town members to more conveniently attend the meetings of the society. F. C. Clements, of Philadelphia, was elected vice-president of the territory comprising Pennsylvania, Maryland, Delaware, District of Columbia, Virginia and West Virginia. A paper on "The Deposition of Zinc" was read by G. B. Hogaboom in the absence of the author, William Schneider. This paper is published in another column of this issue.

The subject for discussion at the next meeting is "The Running of Acid Copper Solutions." A committee of three, consisting of Messrs. Hogaboom, Stremel and Emery, was appointed to arrange for a banquet, for which an effort will be made to have some prominent men of the industry give talks.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.

President, Joseph H. Glauber, Cleveland, Ohio; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1110 Schiller Theatre Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City, but the last meeting was held in Philadelphia. The Semi-Annual Meeting is generally held at Atlantic City or some other seacoast town.

At the meeting of the National Association of Brass Manufacturers, held at the Pontchartrain Hotel, Detroit, Mich., August 24 and 25, 1909, the new discount sheet applying to the new official catalogue was gotten out, and both the catalogues and revised discount sheets will be cheerfully furnished to any legitimate manufacturer or jobber in the United States, or in Canada, upon request to Commissioner W. M. Webster, 1112-1114 Schiller Building, Chicago, Ill.

Three new members from the territory in the United States and one from Canada were added to the list. The officers were directed to petition the transportation companies for an equitable adjustment of freight rates on plumbers' brass goods, plumbers' supplies on all territory north of the Ohio and east of the Potomac rivers, and to extend as far west as the Mississippi river.

The wisdom of establishing a uniform center of bath cocks, when furnished with offset supplies, was discussed without action.

The next meeting will be held in New York City on December 7 and 8, 1909.

ITEMS OF INTEREST TO THE INDIVIDUAL.

Charles L. Constant, the chemical engineer and metallurgist, of 61 Beekman street, New York, has incorporated the C. L. Constant Company, with large offices at 42 Broadway. The other members of the company are Walter H. Weed, a well-known mining engineer and geologist, for many years engaged in survey work for the United States Government. R. B. Lamb, mining engineer of Australia; Frank H. Probert, one of the best-known mining engineers of the West, lately connected with Phelps Dodge & Company, and interested in the development of the Rio Tinto mining district, and C. L. Constant, Jr., chemist and metallurgist.

Plans are being made for one of the most complete and up-to-date laboratories in New York, whereby the company will have enlarged facilities for performing work in all branches of mining and metallurgy. The chemical end of the business will be carried on as before, under the direction and supervision of C. L. Constant. The laboratory at 61 Beekman street will be continued until the new one is ready for occupancy.

E. W. Carter, who has for some time past been in charge of the Boston office of the Hoyt Electrical Instrument Works, will hereafter be connected with the factory at Penacook, N. H., and Mr. A. K. Brown, who has for some time been identified with the Hoyt Works, will succeed Mr. Carter as manager of the Boston office.

J. W. Force has taken charge of the plating department of the North & Judd Manufacturing Company, at New Britain, Conn.

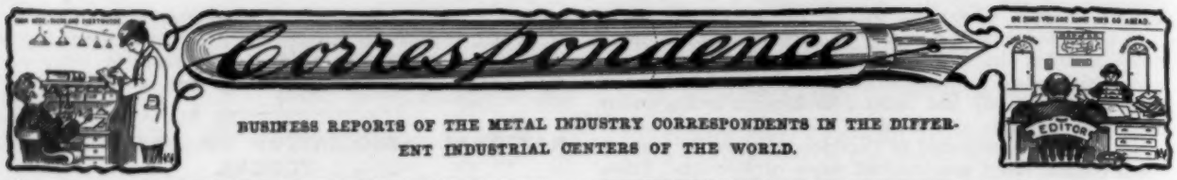
Charles M. Hall, the vice-president of the Aluminum Company of America, has recently undergone a surgical operation but has passed the critical stage of his illness and is making rapid progress toward the complete recovery of his health. Mr. Hall invented the process which is used for the manufacture of aluminum in America.

Thomas Murphy, who formerly operated a brass foundry at 107 Thorn street, Jersey City, N. J., has accepted a position as foundry foreman with F. H. Lovell & Company, Arlington, N. J.

Samuel H. Dougherty, for many years St. Louis sales manager of the Joseph Dixon Crucible Company, is now associated with the Jonathan Bartley Crucible Company, of Trenton, N. J., as their Western representative.

DEATHS

W. W. Oliver, who, as mentioned in our Buffalo correspondence last month, died suddenly in Atlantic City on July 17, was president and founder of the W. W. Oliver Manufacturing Company, of Buffalo, N. Y. The company are builders of machinery for manufacturing jewelers and have been in business for the past 35 years.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

September 7.

Summer is closing here with increasingly brighter prospects, but, with the conservatism which has always marked New England industries, the heads of the various manufacturing corporations are carefully sounding outside conditions before pulling wide the throttle. However, there is little to be pessimistic over in Naugatuck valley towns, for business is steadily increasing and it is generally expected that before the middle of October it may be necessary to go back to overtime schedule to fill orders.

In nearly all the larger shops now the men are working on a six-day full time schedule and the recent order of the New Haven railroad to resume six-day schedule in all its repair shops augurs for a general increase in the demands of railroad departments on Waterbury products used in repairing rolling stock. The stability of brass fixtures has given them a big handicap over those of nearly all other metals and the amount of goods of this nature turned out here is increasing yearly. Not only the New Haven system but practically all the larger railroads are furnishing new rolling stock to take the place of the overworked cars and locomotives which were kept in use during the months of financial stringency for lack of funds, and these departments of brass factories are expecting a long steady demand for the thousand and one small parts which go to the make-up of these big machines and huge vehicles.

There will be but a slight slump in the manufacture of automobile parts in this section during the fall and winter months, it is believed, as automobile makers all over the world are preparing for one of the biggest booms in any single line of business in decades with the approach of the spring of 1910. It is estimated by some that there will be an increase of at least 50 per cent. next year in the early demand for machines and not a few go as far as to prophecy 100 per cent. increase. The manufacture of automobile novelties and various small parts here is becoming one of the most important features of the brass business and every progressive concern is giving it careful attention.

Foundry products seem to be enjoying a boom just now and there are heavy shipments to points in all parts of the world from local shops nearly every week. For that matter, the demand is slight in only a few items in all the divers metal products of Waterbury and little things seem to thrive most. From month to month this column has reported the rushing business of the pin shops hereabouts. During the dullness following the fall of 1907 they were the most lively. They are still at their fast pace and seem likely to continue so indefinitely.

These pin shops are in the suburbs, Waterville and Oakville, and thousands of employees travel from the city to them morning and night on the trolley lines. Periodically there have been serious accidents on these trips and scores of employees have been injured. On account of the general demoralization which follows a wreck on a morning car, and often after an evening accident, the companies have recently delivered a mild ultimatum to the railroad authorities, threatening to take strenuous measures if there is not greater care for the lives and limbs of employees. Trolley accidents actually cause losses in the pin shops and a clash between these corporations may be the result of poor facilities and reckless running of cars.

Up the valley nearly all are wearing smiles. There is no abundance of help, but as yet no great scarcity. Dull times have been ended in the mills of Torrington controlled by the American Brass Company and overtime has been necessary spasmodically during the past month. After a long dull period the Excelsior Needle Company of the same borough resumed a six-day schedule with full force. The smaller concerns are doing as well. In Ansonia, the other large center of the American Brass Company, the factories are all busy and help is none too plentiful. The outlook in that section is excellent for fall and winter.

Now that the tariff law has been passed, the men to whom it is a real, tangible thing are studying between the lines and not a few surprises are resulting. One which will interest nearly all metal manufacturers is the so-called zinc "joker." Quietly enough zinc was taken off the free list and the price of the product of Michigan concerns has accordingly jumped over 10 per cent. since the law passed. Before the tariff bill went through the price was reasonably low. The importations of zinc, it appears from statistics, were almost nil. Protection to a product not requiring it has boosted the price, and that there will be some interesting developments in zinc in the busy times to follow is not unlikely.

Sales forces at the present time are at a minimum and with new business coming in well it is naturally expected that the returns for September, when the field work will become aggressive, will be near, if not up to, the fine records of early in 1907 and the wonderful fall of 1906. F. B. F.

PROVIDENCE, R. I.

September 7.

Nearly all the jewelry shops in this city and vicinity have commenced to feel an improvement in trade. Salesmen who recently started on fall trips are sending in good orders and in numerous instances manufacturers are beginning to consider again the advisability of running overtime. Factories in some lines have not yet felt the impetus of better times, but these are of the class which would be slowest to get the benefit of returning prosperity. Providence and Attleboro jewelers are confident that this season will make an excellent record for them.

George E. Darling, one of the best known jewelers and yachtsmen in Rhode Island, died August 29 at his old home in Searsport, Me. Mr. Darling's place of business was located at 21 Eddy street, this city. He had been established here 14 years. He was particularly well known in yachting circles through his ownership of the fast catboat "Mblem" which won many cups on Narragansett Bay a few years ago. For a number of years he was Secretary of the Rhode Island Yacht Club. He had been ill for a number of months prior to his death.

The culmination in the case of John Nelson, who was convicted by a jury several weeks ago on a charge of receiving stolen goods, came recently when Nelson was adjudged of unsound mind and dangerous to the public and committed to the State Hospital for the Insane. The case has attracted the closest interest of the jewelers of this section because of the nature of the charges, it being asserted that Nelson had received valuable scrap stolen from other shops.

Thirty employees of John Austin & Son, gold and silver refinerss held their annual outing on Narragansett Bay, Aug. 28. The first event on the programme was a dinner at Field's Point. Then the party sailed over to Crescent Park where athletic contests consumed the rest of the afternoon.

A small fire did quite a little damage recently in the brass foundry on Conduit street owned by Congdon Brothers. The flames broke out in the rear of the building but were confined to a small area.

George E. Brady, of this city, has been elected fourth vice-president of the Jewelry Workers of North America. He was nominated by some outside union without his knowledge and his election was a great surprise to everybody connected with the jewelry workers' organization in Providence. The two Providence candidates, who made a good run in spite of the fact that they were defeated, were Edward O'Connor and John Moran, who tried to get the offices of third and fourth vice-presidents, respectively.

The second annual outing of the employes of the Theodore W. Foster & Bro. Company was held at Boyden Heights. Two

hundred employes made the trip. In behalf of the employes John Laselle presented Theodore W. Foster, president of the company, with an engraved silver loving cup. A baseball game and athletic contests for men and women furnished the chief part of the entertainment. Among the guests were Mr. and Mrs. Theodore W. Foster, Clyde Foster, William Foster and I. F. Foster.

Harry T. Prince has been arrested on a charge of stealing gold and silver scrap from the jewelry factory of Watson & Newell, of Attleboro, where he was employed. From time to time the firm missed valuable scrap and turned the case over to detectives with the result that he was arrested and admitted stealing the goods. He was caught in Pawtucket and turned over to the Attleboro police.

About 100 chasers and engravers from the Gorham Mfg. Company held their annual outing at the Warwick Club. A ball game between the two departments for a silver cup furnished most of the excitement. A Rhode Island clambake was served. E. S. U.

BUFFALO, N. Y.

September 7.

Business in our lines last month was better all around than in any similar period this year and there is every prospect that September will show an appreciable gain over its predecessor. With the tariff out of the way, heads of local shops are noticing a more secure feeling among their customers and good-sized orders are beginning to come in from sections that were not heard of before. Collections were still slow but renewed activity looks hopeful. Brass founders noticed a decided improvement among the trade. They are getting more orders for special work and the builders are buying more bric-a-brac and special designs of brass and copper for trimmings.

The Buffalo Brass & Copper Company, which now manufactures only copper sheets and rolls, will have its new mill costing about $100,000 finished in the next 60 days and will then turn out brass sheets, brazed brass tubes, rods and wire. This company reports conditions as satisfactory. Its distributing agents about the country are sending in good orders. There is a fair demand for sheet copper in the city also.

The Lumen Bearing Company which recently opened a new brass foundry is going to build again. It has accepted bids for a pattern shop and foundry for heavy work to be built on the south side of its present plant that is to cost $4,000. This firm has been fairly busy, last month being especially good with it.

The Allyne Brass foundry is building an addition to its plant in Niagara street. This concern is having a busy season and reports plenty of work ahead. The smaller brass firms here are turning out enough for the vicinity trade to keep operating almost to capacity. The increased activity in building is giving the supply houses more business and they ought to close the season ahead of last year's figures. Organized gangs of wire thieves are giving the telephone and telegraph companies much trouble and mile after mile of wire was stolen last month.

The coming show of the Buffalo Industrial Exposition to be held in October promises to see at least a score of local houses in our lines with exhibits and great interest is manifest in the success of the fair. Mr. Wuest, of Cleveland, commissioner of the National Metal Trades Association was a visitor here last month. F. M. A.

DETROIT, MICH.

September 7.

The Aluminum Castings Company, with a capitalization of $800,000, has acquired the properties of the Allyne Brass Foundry and the Eclipse Foundry Company, both of Detroit. This concern occupies the same position in the brass world as the General Motors Company does in the automobile industry. Besides the Detroit company it has acquired the Allyne Brass and Foundry Company, of Buffalo; the Syracuse Aluminum & Bronze Company, of Syracuse, N. Y., and the United States Aluminum Company, of New Kensington, Pa.

All these acquisitions have been made during the past month. The capitalization hardly represents the business, for the Allyne company in Detroit alone turns out $1,000,000 worth of castings a year.

The announcement of the consolidation follows on the heels of the purchase by the Allyne people of twenty-three acres of land on Cheney street in this city, on which mammoth factory buildings are to be erected.

Charles B. Bohn, vice-president and general manager of the Allyne company, came to Detroit only four and a half years ago and established a small plant as a branch of the parent establishment in Cleveland. Since then the infant plant has far outgrown the parent. Additions have been made to the plant on Bellevue avenue here until there is no more opportunity to grow in that locality. This business could not be cramped owing to the tremendous demand for aluminum castings by the automobile companies here and elsewhere. The aluminum business soon far outgrew the brass business. Hence the purchase of the twenty-three acres for the new plant here in Detroit.

"The reason for the growth of the business is that without any question Detroit is the greatest automobile city in the world," says Mr. Bohn. "We looked for the largest growth in this city, so we must have the biggest plant here. The 23-acre tract may seem large, but we are going to use it all. The first building to be erected will be 350 x 350. We hope to have it ready for occupancy by December 1. There is great difficulty in getting steel in that time and perhaps we may be a little late. We now employ 300 men; the Eclipse company which will be merged, of course, employes about 100. When we open the new establishment the first of the year we expect to put 1,000 men at work on aluminum castings alone. The brass business will be continued in our present location until we can get more buildings erected on the new site. We expect to keep on adding to the plant for the next two years. The Detroit plant will do the bulk of the business of the new organization. It already does as much as all the other concerns entering this organization. We supply fully seventy-five per cent. of the aluminum castings used on automobiles in this country. When we get our breath in this automobile business we are going to push aluminum for other uses. It is a great metal and not made as much of as it should be. Under the new arrangement the Aluminum Castings Company intends to continue to operate each of the plants except the Eclipse and continue the business of each under its former management."

Secretary Whirl, of the Employers' Association, reports trade good in all the brass establishments in the city. It is about the same as it was during the past month. Manufacturers are pushing the business for all it is worth and are meeting with success.

The jewelry business continues moderately good and manufacturers here are planning for a steady improvement from now on. The fall is good for this line and it always keeps up until the holidays. F. J. H.

CLEVELAND, OHIO.

September 7.

Not in three years has the metal trades business been so active in Cleveland as at the present time. All the brass foundries and the numerous brass factories report operating with a full force of men. The plumbing supply manufacturing establishments are busy turning out stock for the big building trades demand and few men who are at all skilled in the metal industry are now idle. It is estimated that there are forty per cent. more men employed now than at this time last year.

The plating business is also in fine shape. When the brass and manufacturing business is good the platers always find plenty to do. The automobile manufacturing business is booming, even though the open air season is gradually drawing to a close. The vapor and gasoline stove business has experienced a big impetus during the past six months and as considerable brass and nickel work is used in connection with the higher grade it has helped the industry generally.

By long odds the most interesting event in Cleveland of the past month has been the announcement of the Aluminum Castings Company, of Cleveland, that an enlargement of its capital from $10,000 to $800,000 is to be made. Application to that effect has been made with the Secretary of State at Columbus. It is claimed by those who know, that this is the first step towards a combination of four or five of the largest aluminum casting plants in America. The companies which will probably enter the combination are The Allyne Brass Foundry Companies of Cleveland, Detroit and Buffalo, the Syracuse Foundry Company and the aluminum castings department of the Aluminum Casting Company of America, which maintains its headquarters at New Kensington, Pa. S. L. M.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

A new brass and aluminum foundry has been established at Kenosha, Wis., under the firm name of Charles Anderson & Brothers' Foundry.

The Geneva (Ill.) Foundry & Machine Company is erecting an extensive addition to its plant. Contracts for all the materials required have already been placed.

The report that the Allis-Chalmers Company's Milwaukee, Wis., foundry is to be doubled in size is denied by the company who state that there is absolutely no foundation for such statements.

The Warner & Swasey Company, Cleveland, O., will erect a two-story building in Chicago, to be used as a salesroom for their brass-worker's lathe and machine tools. It will be situated next to the Brown & Sharpe Manufacturing Company on Washington Boulevard.

The Canton Brass and Machine Company, Canton, Ohio, has bought out the Canton Brass Company. The officers of the company are C. W. Keplinger, President; C. A. Dougherty, Vice-President; C. H. Knight, Treasurer, and S. S. Weart, Secretary and General Manager.

The Sterling Casket Hardware Company, 423 Kent avenue, Brooklyn, N. Y., have recently installed a plating plant, under the supervision of Alfred Pritchard, who was for a long time connected with Benziger Brothers, Brooklyn, N. Y., as foreman plater.

The Pequonnock Foundry Company, Bridgeport, Conn., are erecting a new foundry on Fifth street, after designs by Wonham, Magor & Sanger, engineers, New York, which will give them double the capacity of their present plant. The company will make a specialty of automobile and marine gasoline engine cylinders.

A large addition to the brass and aluminum foundry of Edward J. Blake, Hartford, Conn., which is almost completed will give this concern better facilities than ever for handling a large volume of business. About eighty men are employed at present and the number will be almost doubled when the new portion of the plant is put into service.

The Brush Runabout Company, Detroit, Mich., is erecting a large plant consisting of ten or twelve buildings which will be used for the manufacture of automobiles and automobile parts and which include a brass foundry, machine shop, case hardening and tempering building and an enameling plant. A large amount of equipment for these buildings has already been ordered.

The International Chemical Company, Camden, N. J., announce that they are prepared to analyze, free of charge, any samples of caustic potash, lye, caustic soda, cleansing compounds and soaps of all kinds for any consumers of these goods who will mail samples of what they are now using, and to quote prices on corresponding articles. No obligation of any kind is incurred by accepting this offer.

The Metal Dross Economy Company reported that they have just settled out of court with a manufacturing brass concern that was infringing on their patented process of skimming metal skimmings into water, and express themselves entirely satisfied with their adjustment of the case. Business is very good with them, having equipped several brass foundries with their skimming tanks during the summer months.

The Metal Products Company, of which R. D. A. Thompson is president, Russell Thompson, secretary and treasurer, and Mr. Haley general manager, has closed a contract to purchase a block of land at Beaver, Pa., upon which a factory will be built and equipped at a cost of $100,000 to manufacture dies for gold, silver and brass goods manufacturers. The company was formerly located at Beaver Falls, Pa., but was burned out some time ago.

Charles F. L'Hommedieu & Sons Company, of Chicago, manufacturers of and dealers in platers' and polishers' supplies, have increased their business to such an extent that they have been compelled to get more room, which they have secured in their present building, and are now occupying double the space they did heretofore. They have also added another strong man to their selling force in the person of Mr. Charles Tollefsen, who is well known to the trade.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m. September 28, 1909, and publicly opened immediately thereafter, to furnish at the navy yard, Mare Island, Cal., a quantity of naval supplies, as follows: Brass rod. Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office, San Francisco, Cal., or to the Bureau. E. B. Rogers, Paymaster-General, U. S. N.

The J. A. Kerr Company, manufacturers' agents, located at 414 Rockefeller Building, Cleveland, Ohio, would like to correspond with firms who are in a position to manufacture door-weights of from 1,000 to 5,000 lots. They are also in the market for from 3,000 to 5,000 paper weights. The weights are to be made of base metal finished in oxidized silver finish, bronze finish or an oxidized copper finish. Full particulars will be furnished by the above mentioned company to any firms who are in a position to do this work.

The Nathan Manufacturing Company, located at 416 E. 106th street, New York City, are at the present time casting from 10,000 to 11,000 pounds of high-grade bronzes every day. A record performance being the casting, on Friday, September 3, of 13,400 pounds of steam injector metal. The metal was melted and poured in practically eight hours. For melting and mixing this large amount of metal, four "M. R. V." furnaces were used. Each furnace had a capacity of 440 pounds per heat. This establishes a record for production by this furnace in this country.

Alfred J. Thompson, 71 Broadway, N. Y., is establishing an organization designed to assist manufacturers of mechanical equipment of all kinds to reach the markets of Cuba and Central and South America, and the headquarters of the organization will be in New York. He will have associated with him resident representatives in each of the large cities in the territory covered, who will keep in touch with local conditions, report on the prospective requirements of the markets, etc. Mr. Thompson was formerly connected with the sales departments of the Allis-Chalmers and the Crocker-Wheeler companies and has spent much time in the territory which will be included in his new field of activity.

Considerable progress has been made with negotiations which are under way looking toward the consolidation of the Pratt & Cady Company, Hartford, Conn., with the Chapman Valve Company, Indian Orchard, Mass. In the latter part of August a new issue of $300,000 of Chapman Valve stock was reported to have been subscribed for and the stockholders of the Chapman Valve Company had voted to buy part of the property of the Pratt &

Cady Company. A definite proposition was made to the latter concern by the Chapman company and action on it is expected within a few days. In the event of the deal being consummated the property of the Pratt & Cady Company, with the exception of their real estate, would be handed over to the Chapman Valve Company.

The Celluloid Zapon Company, 310 Fourth avenue, New York, are making large additions to their plant at Stamford, Conn., giving them about 15,000 square feet additional for floor space. The construction and equipment of the whole of this Stamford plant is up-to-date in every respect. The buildings are of unusually heavy construction. Every precaution is taken to prevent fires, the liquids all being piped from one department to another by means of compressed air and all other operations being made as automatic as possible so that the risk of vexatious delays in making deliveries to customers is reduced to a minimum. The company reported unusual activity in the sales department for the month of July, their records showing it to have been the biggest month in the company's history.

REMOVALS

G. J. Nikolas & Company, the well-known lacquer manufacturers of Chicago, Ill., announce that under the new system of house numbering which went into effect in Chicago on September 1 their new number is 1227-1229 West Van Buren street, instead of 400-402 West Van Buren, as under the old system.

The L. H. Gilmer Company, manufacturers of endless polishing belts, of Philadelphia, Pa., announce that owing to the success of their belts they are again compelled to remove into larger quarters at 52 N. Seventh street, where they have equipped a large building with improved machinery for the manufacture of belts. The Gilmer Company hope to hasten deliveries and improve their product.

FIRES

The plating works of H. F. Nokes, of Adrian, Mich., was destroyed by fire on August 13. The damage is estimated at $1,600, partly covered by insurance.

The Glauber Brass Manufacturing Company, of Cleveland, Ohio, report that owing to the spontaneous combustion of lint, which had accumulated in the roof of their polishing department, they had a small fire which was of no consequence. The damage was estimated by the daily press to be $100.

The firm of Hendricks Brothers, New York, report that the published statement of $100,000 loss from the fire at their Soho, N. J., plant in August was greatly exaggerated. The damage was chiefly to the buildings which are already partially rebuilt and the mill is again rolling copper. The firm is one hundred years old.

FINANCIAL

At the recent stockholders' meeting of the Progressive Metal and Refining Company, Milwaukee, Wis., the company increased its capital stock from $50,000 to $100,000 and say that the majority of the stock was subscribed for and paid. The increase of the company's capital stock will give them a sufficient amount of capital to conduct business on a very large scale in the handling of new and old metals. The Progressive Company will manufacture white metal of all descriptions in addition to the red metal they now make.

Holders of preferred stock of the Michigan Copper and Brass Company have received the first dividend to be paid by this concern, which went into operation in August, 1907. The dividend is 3 per cent. for the semi-annual period ending January 15, 1908.

Considering the fact that the plant was placed in operation at the beginning of the 1907-1908 depression, during which many of the old established concerns did a much reduced business, the showing of the new industry is an excellent one.

"We are very busy, and have all the business we can do for the next two months," said George H. Barbour, who is active in the management of the plant. "Our orders now are 70 times heavier than they were at this time a year ago."

George H. Barbour, Jr., who has been associated with his father in the Michigan Copper and Brass Company, being elected treasurer at the formation of the company, has also been given the duties of secretary. As manager of sales, the company now has with it Charles Sparks, formerly with the big Simmons hardware house, of St. Louis.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

STANDARD TUBE AND METAL COMPANY, Newark, N. J.; capital $50,000. Incorporators, Peter H. Seery, Irving P. Seery and Frances E. Seery.

STANDARD ALUMINUM COMPANY, Manitowoc, Wis., capital $15,000. Incorporators: Adolph Kummerow, W. S. Bremer and Charles Lesmer.

THE PHILADELPHIA ART METAL COMPANY, Camden, N. J., to manufacture metal novelties, capital $50,000, filed articles of incorporation in the office of the County Clerk. The incorporators are David M. Patton, Jacob J. Staley and Albert W. Staley.

THE MINNESOTA BRASS WORKS, 2110 West Michigan street Duluth, Minn. S. T. Rery, president; J. I. Foster, manager. To manufacture stick brass, journal brasses, brass bearings, babbitt metal, locomotive and marine castings, and to do general repair work.

PRINTED MATTER

THE BLAST, a journal devoted to the foundry business and issued "once in a while" by The Detroit Foundry Supply Company, Detroit, Mich., is sent free to those in the trade and contains a large amount of newsy personal matter and information of a useful nature pertaining to foundry practice.

The S. Obermayer Company, Cincinnati, O., publishes every month a Bulletin of Foundry Information, the September number of which will contain the first of a series of articles by R. H. McDowell, one of the most practical foundrymen in the country. The first instalment is addressed to foundrymen who have trouble with dead, dirty, hard iron, breakages and heavy losses in general, cupola slow melting and hanging when bottom is dropped, the last charge not melting at all, and similar troubles. Definite rules by which many of these difficulties may be overcome are to be given. Those desiring to read the series may have the Bulletin sent to them regularly free of cost by addressing the company's Cincinnati office.

THE HOYT VOLTAMMETER for testing ignition circuits is described in a neat folder published by the Hoyt Electrical Instrument Works, Penacook, N. H. This voltammeter consists of a type C. 25 ammeter and voltmeter mounted on a single base and so wired into the ignition circuit that both instruments are in circuit during the whole period that the engine is running. The voltmeter gives a continuous indicator of the voltage of the batteries and battery circuit, while the ammeter shows any change that may occur in the circuit whereby the current flow is increased or diminished. Thus the voltmeter and the ammeter together in circuit indicate closely the condition of the system and enable the operator to keep his ignition equipment at its highest efficiency at all times. The pamphlet also describes various other types of ammeters and voltmeters.

ADNEWS

Kendrick & Davis, Lebanon, N. H., are advertising their No. 19 K & D plating dynamo. The special features of this type are described and prices and other particulars are given.

Among THE METAL INDUSTRY advertisers whose products are being exhibited in the model foundry at the Alaska-Yukon-Pacific Exposition at Seattle, Wash., are the Detroit Foundry Supply Company, sand blast equipment; The W. W. Sly Manufacturing Company, Cleveland, O., cinder crushers and dust collectors, and The Monarch Engineering & Manufacturing Company, Baltimore, Md., metal melting furnaces.

The use of steel balls in tumbling barrels is increasing rapidly, and to supply the demand created for balls suitable for this purpose The Abbott Ball Company, 14 Hicks street, Hartford, Conn., have put on the market and keep in stock three sizes, one-eighth, three-sixteenths and one-quarter inch in diameter, respectively, all made exclusively for tumbling purposes. The Abbott Company's advertisement appears on another page.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	September 10, 1909. *Pounds.*	
Stock of marketable copper of all kinds on hand at all points in the United States, August 1, 1909....		122,596,607
Production of marketable copper in the United States from all domestic and foreign sources during August, 1909		120,597,234
		243,193,841
Deliveries:		
For domestic consumption.....	59,614,207	
For export	48,382,704	
		107,996,911
Stock of marketable copper of all kinds on hand at all points in the United States, September 1, 1909		135,196,930
Stocks increased during the month of August.....		12,600,323

METAL MARKET REVIEW

NEW YORK, September 8, 1909.

COPPER.—The price for standard copper in London is about £1 higher than a month ago. Trading has been fairly active and spot standard copper sold as high as £60 12s. 6d. and closed at £59 13s. 9d. The lower prices on the first of September were due to the heavy increase in the foreign stocks.

The New York market has been very dull, prices during the first half of the month were fairly strong and showed an advance of about ¼ cent per pound, the better feeling in the market was partly due to the good showing made by the statistics issued by the Copper Producers' Association on the 10th of August, showing a decrease in the stocks of 32,000,000 pounds during the month, the deliveries being 150,539,057 pounds against a production of 118,277,603 pounds. These heavy deliveries looked very good at the time and the market naturally stiffened, but on the publication of the foreign statistics on the 15th of the month it is to be noted that the foreign stocks increased over 4,000 tons during the two first weeks of August and the foreign statistics as published August 31 show a further increase in the foreign visible supply of copper, as carried in warehouses in England, of 8,000 tons, making an increase in the foreign stocks of 12,000 tons during the month of August, this naturally has a depressing effect on the market in London and America, and it is predicted the figures to be issued on the tenth of September will not make such a favorable showing.

Trading in standard copper on the New York Metal Exchange has been fairly successful, some 3,000 tons were dealt in during the month and for the dullest month of the year and a sagging market this new method of trading was a success; on an active market the sales of standard are likely to be very heavy.

The prices of lake, electrolytic and casting advanced about ¼ cent per pound during the first half, but at the close the market is dull again and prices are slightly lower than a month ago. Lake 13.10 electrolytic 13 cents and casting 13 cents.

TIN.—The London tin market has been quite active and prices were run up nearly £7 per ton over the opening figure of £133 15s., closing at £139 5s., the figures show a net advance for the month of close to £6 per ton.

The New York market has been fairly active with prices today about ½ cent per pound higher than a month ago.

The consumption during August is estimated at 3,300 tons, the total visible supply of tin is about 1,000 tons less than a month ago. The deliveries for consumption in America for the eight months of this year show an increase of 5,050 tons over the same time last year.

The market closes fairly steady, spot tin 5-10 tin lots 30 cents, futures 5 to 10 points higher.

LEAD.—The foreign lead market holds steady around £12 12s. 6d.

In the New York market the price is about 5 points higher than a month ago, opening at 4.35 the market advanced to 4.45 New York delivery and closes at 4.35 to 4⅜.

In East St. Louis the market opened at 4.20 and closed at 4.25, carload lots.

SPELTER.—The foreign price of spelter has advanced about 10s. per ton.

In the New York market spelter has been strong and fairly active with prices today about ¼ cent higher than a month ago. Carload lots New York 5.75 with futures 5 to 10 points higher.

ALUMINUM.—The market for aluminum has been a shade easier and the domestic aluminum is quoted at 23 to 24 cents per pound with the imported metal about 1 cent per pound lower.

ANTIMONY.—The foreign price of antimony declined £1 per ton during August at the close of the market is 10s. better again at £29 10s.

In New York the market has been firmer and prices show an advance for the month of about ½ cent per pound. Cooksons 8⅝, Halletts 8⅜ cents.

SILVER.—The London silver market is about ½d. higher than a month ago, 24 to 23⅞d. at the close.

In the New York market prices are about 1¼ cents per ounce higher, opening at 50¾ and closing at 52 cents.

QUICKSILVER.—There has been no change in the price of quicksilver either in London or New York. Wholesale lots $43 to $43.50 per flask, jobbing lots $44 to $45.

PLATINUM.—The market for platinum has been firmer and prices have advanced $1 per ounce. Ordinary $24 to $24.50, hard $26 to $26.75.

SHEET METALS.—There has been no change in sheet copper or brass. Copper 17 cent base and wire 15 cent base. Brass 14 cents base with rods and wire at 14¼ cents.

OLD METALS.—There is very little change in the old metal market, with a sagging copper market. Consumers of scrap copper are all looking for lower offers and with any kind of an advance in London cables dealers will mark up their prices. Business is better and there is more inquiry from consumers.

THE AUGUST MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	13.65	13.25	13.50
Electrolytic	13.30	12.90	13.00
Castings	13.00	12.90	13.00
TIN	30.90	29.35	30.00
LEAD	4.45	4.30	4.40
SPELTER	5.80	5.45	5.70
ANTIMONY (Hallett's)	8.35	7.75	8.25
SILVER	.52	.50¾	51.25

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1909. Jan. 14⅜ Feb. 13¼ Mar. 12⅞ April 13 May 13¼ June 13½ July 13½ August 13½.

Trade Wants on Advertising Pages 38 to 40 Following

Metal Prices, September 10, 1909.

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, car load lots	13.10
Electrolytic, car load lots	13.00
Casting, car load lots	13.00
TIN—Duty Free.	
Straits of Malacca, car load lots	30.00
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2¾c. per lb.	
Pig lead, car load lots	4.35
SPELTER—Duty 1¾c. per lb. Sheets, 1⅜c. per lb.	
Western, car load lots	5.75
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	24.00
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	8.65
Hallett's, cask lots	8.35
Other cask lots	7.70
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.80
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem	$1.50
BISMUTH—Duty free	1.80
CADMIUM—Duty free	.95
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.52
PLATINUM—Duty free	24.00
QUICKSILVER—Duty 7c. per lb. Price per pound	60c. to 61c.

OLD METALS.

Dealers' Buying prices. Cents per lb.		Dealers' Selling prices. Cents per lb.
11.50 to 12.00	Heavy Cut Copper	12.50 to 12.75
11.25 to 11.50	Copper Wire	12.25 to 12.50
10.00 to 10.50	Light Copper	11.00 to 11.25
10.75 to 11.25	Heavy Mach. Comp.	12.00 to 12.50
8.00 to 8.50	Heavy Brass	9.00 to 9.25
6.00 to 6.50	Light Brass	7.00 to 7.25
7.50 to 8.00	No. 1 Yellow Brass Turnings	8.25 to 8.50
8.50 to 9.00	No. 1 Comp. Turnings	9.50 to 10.00
4.00 to 4.20	Heavy Lead	4.25 to 4.30
3.50 to 3.62½	Zinc Scrap	3.62½ to 3.87½
5.00 to 6.00	Scrap Aluminum, turnings	5.00 to 6.75
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
18.00 to 19.00	No. 1 Pewter	—— to ——
20.00 to 25.00	Old Nickel	20.00 to 25.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%....according to quantity	28 to 35
Silicon Copper, 30%, guaranteed " "	38
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	9 to 10
Brass Ingot, Red " "	12 to 13
Bronze Ingot " "	11 to 12
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35
PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 17 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ¾ inch diameter or over.....Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1¾c. per lb.	Cents per lb.
Carload lots, standard sizes, at mill	7.50 less 8%
Casks	8.00
Open casks	8.50

Metal Prices, September 10, 1909

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect June 21, 1909, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13½	$0.15½	$0.17
Wire	.13¾	.15¾	.17¼
Rod	.13¾	.15¾	.18¼
Brazed tubing	.19⅜	—	.21½
Open seam tubing	.17⅜	—	.19½
Angles and channels, plain	.17⅜	—	.19½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " "
Wire—Extra spring and brazing wire	½c.	" " "
" —Best spring and brazing wire	1c.	" " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14½	$0.16½	$0.18
Wire	.14¾	.16¾	.18¼
Rod	.14¾	.16¾	.19¼
Brazed tubing	.20⅜	—	.22½
Open seam tubing	.18⅜	—	.20½
Angles and channels, plain	.18⅜	—	.20½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance.
" —Best spring, drawing and spinning brass....	1½c.	" " "
Wire—Extra spring and brazing wire	½c.	" " "
" —Best spring and brazing wire	1c.	" " "

BARE COPPER WIRE—CARLOAD LOTS.

15c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c. per lb. base.
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1⅛ to 3⅛ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet— Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	14c.	lb. net base
" " " Rectangular sheets other than Sheathing	16c.	" " "
" " " Rod	15c.	" " "
Tobin Bronze Rod	16c.	" " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough 22¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including..... in coils.	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No. 13 and heavier		34	34	36	36	36	36	39	39	39
" 14		34	34	36	36	36	36	39	39	39
" 15		34	34	36	36	36	36	39	39	39
" 16		34	34	36	36	36	36	39	39	39
" 17		34	34	36	36	36	36	39	39	39
" 18		34	34	36	36	36	36	39	39	42
" 19		34	34	36	36	36	36	39	40	43
" 20		34	36	36	36	36	38	41	42	44
" 21		34	38	38	38	38	40	43	44	50
" 22		34	38	38	38	40	40	43	47	51
" 23		34	38	38	38	40	40	43	49	52
" 24		34	38	40	42	42	42	45	51	54
" 25		36	39	41	43	43	43	46	53	57
" 26		36	39	42	46	46	46	51	55	61
" 27		36	40	44	48	48	49	54	58	64
" 28		36	40	46	48	49	49	56	62	67
" 29		38	41	48	50	52	52	61	67	72
" 30		38	42	50	52	56	62	66	72	77
" 31		43	47	55	58	63	71	74	77	83
" 32		45	49	57	61	60	77	91	90	95
" 33		47	51	60	65	73	84	91	100	110
" 34		50	55	62	70	78	91	103	110	120
" 35		..	65	70	80	90	100	115	125	..
" 36		..	80	90	100	115	120	135	..	..
" 37		..	104	114	129	144	159	174	..	..
" 38		..	124	139	154	169	184	204	..	..
" 39		..	144	164	184	204	224	..	..	..
" 40		..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Guage.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	29	20	26	30	56	
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80	
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19, B. & S. Gauge, inclusive		$0.60
6	"	"	19,	"	.70
9	"	"	19,	"	.85
12	"	"	19,	"	1.00
15	"	"	19	"	1.15
16	"	"	19,	"	1.20
18	"	"	19,	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .900 fine are quoted at 2c. to 3c. above the price of bullion.

SEE PAGE 38 FOR WANT ADVERTISEMENTS

METAL ROLLING MILLS.

INGOT, SHEET, ROD, WIRE, TUBE, METAL GOODS.

HENDRICKS BROTHERS
Manufacturers of
Sheet and Bar Copper
COPPER FIREBOX PLATES
and STAYBOLTS
WIRE and BRAZIER'S RIVETS
IMPORTERS AND DEALERS IN
INGOT COPPER, BLOCK TIN,
SPELTER, LEAD, ANTIMONY
BISMUTH, NICKEL, Etc.
49 Cliff Street, NEW YORK

Established 1802 Cable Address: "Scovill"
SCOVILL MFG. CO.
WATERBURY, CONN.
THE LARGEST AND MOST FULLY EQUIPPED BRASS ROLLING MILLS AND METAL GOODS MANUFACTURING ESTABLISHMENT IN THE WORLD
Estimates for Specialties in Brass, German Silver and Aluminum furnished on application.
DEPOTS:
NEW YORK: 75 Spring St. BOSTON: 170 Summer St. CHICAGO: 210 Lake St.

WATERBURY BRASS CO.
General Offices, Mills and Factories.
Waterbury, Conn.
NEW YORK OFFICE, 99 JOHN STREET.
Providence (R. I.) Store, 131 Dorrance St.
Shipments Upon Receipt of Order
From Large Stock of
SEAMLESS DRAWN BRASS COPPER TUBING
BRASS {SHEET ROD WIRE} COPPER {SHEET ROD WIRE}
AT WATERBURY GERMAN SILVER {SHEET ROD WIRE}

Non-Corrosive Finest Quality
COPPER AND YELLOW
(Muntz) Metal
Naval Brass
Naval Bronze
Manganese Bronze
Plates, Sheets, Bolts, Bars, Rods, Nails, Tacks, &c.
Taunton-New Bedford Copper Co.
NEW BEDFORD, MASS.
71 Water St., New York 61 Batterymarch St., Boston

C. G. HUSSEY & CO.
PITTSBURGH, PENNA.
Manufacturers of
COPPER
In Sheets, Plates, Rolls
ANODES
Tacks and Nails

Bridgeport Brass Co.
BRIDGEPORT, CONN.
Postal Telegraph Building,
Broadway and Murray St., New York
17 N. 7th Street, Philadelphia
Manufacturers of
Brass and Copper {Sheet Tubing Wire and Rods.
Metal Goods Made to Order from Sheet, Rod, Wire and Tubing

BRASS and COPPER in Sheets and Rolls
SILVER PLATED METAL (for Coach Lamps)
BRITANNIA METAL
B. & M. BABBITT METAL for Bearings
LINING METAL for Automobile Bearings and Copper for Electrical Purposes
H. K. & F. S. BENSON
GLEN RIDGE, N. J

THE SEYMOUR MFG. CO.
SEYMOUR, CONN.
German Silver
BRASS, COPPER and BRONZE IN SHEETS, WIRE, RODS and TUBES
COPPER AND NICKEL ANODES
Resistance Wires, Wire, Shot Copper

UNITED WIRE & SUPPLY COMPANY
109 SUMMER STREET,
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SEAMLESS BRASS and COPPER TUBING 1" O. D. and smaller in thin gauges. Lightning Rod Points and other tapered tubes.

The Ansonia Brass and Copper Co.
99 John St., New York
MANUFACTURERS OF
BRASS and COPPER Sheets, Tubes, Rods and Wire
SOLE MANUFACTURERS TOBIN BRONZE
(Trade-Mark Registered)

PHENIX TUBE CO.
Manufacturers of
Brass and Bronze Iron Lined Tubes
Brazed Steel Tubes,
Round and Square.
Main Office and Mills: Brooklyn, N. Y. City Branch Offices: Chicago, San Francisco

Baltimore Copper Smelting and Rolling Company
BALTIMORE, MARYLAND,
SHEET COPPER

ΜΕΤΑΛΛΟΣ
TRADE MARK
"RIVERSIDE" German Silver Phosphor Bronze
Sheets, Rods, Wire, Ingots, Castings, Jewelers' Bars and Alloys
The Riverside Metal Co.
Riverside, Burlington Co., N. J.

THIS SPACE
For Sale
SEND for RATES

SEE PAGE 38 FOR WANT ADVERTISEMENTS

DIRECTORY

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MANUFACTURERS OF
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NICKEL SILVER, BRASS, COPPER, BRONZE AND PURE COPPER
TUBING FOR ELECTRICAL PURPOSES
Odd and Special Shapes, and Small Tubing, a Specialty
—ALSO THE—
Bourdon Steam Gauge Springs
All sizes from 8 to 36, B. & S. Gauge.

The BUFFALO TUBE CO.
255 RANO STREET
BUFFALO, N. Y.
SMALL SIZES
Seamless Brass and Copper Tubing
PROMPT DELIVERY

LINTON & CO.
95 PINE STREET PROVIDENCE, R. I.
MANUFACTURERS OF
SEAMLESS BRASS .. **TUBING**
In Small Sizes
GOLD SOLDER, sheet or wire.
SILVER SOLDER, sheet or wire.
SHEET BRASS SOLDER

We Sell Ingot Copper, Bar Tin, Bar Lead, Ingot Aluminum and Cube Nickel

STANDARD ROLLING MILLS
363 Hudson Avenue, Brooklyn, N. Y.
Refiners and Rollers for the Trade
SHEET BLOCK TIN, BRITANNIA AND BLACK METAL
ROLLED PROMPTLY AT REASONABLE PRICES
Inquiries Solicited.
We Also Make WHITE METAL and ANTIMONIAL LEAD CASTINGS for Novelty Manufacturers.

WM. F. RENZIEHAUSEN CO.
Rollers of Silver Anodes and Sterling Silver
ALSO DEALERS IN
FINE GOLD AND SILVER
43-47 Oliver St., Newark, N. J.
Long Distance Phone 3759 R.

THE PILLING BRASS CO.
WATERBURY, CONN.
Brass and German Silver
6 in. and narrower
.005 and thinner
PLATERS' METAL A SPECIALTY

Established 1859. Long Distance 'Phone.
John Toothill
White Metal Rolling Mill
Casting, Rolling and Refining for the trade.
Sheet Block Tin and Britannia
ROCHELLE PARK, NEW JERSEY.

THIS SPACE FOR SALE
Send for Rates

SEAMLESS STEEL TUBING
From 3 in. Diameter to 1-64 in.
Finished Bright, Smooth and Accurate to 1-1000 in. Inside and Out
Tool Steel Tubing. Soft Steel Tubing. Also Small Brass, Copper and Aluminum Tubing.
ELLWOOD IVINS TUBE WORKS
Oak Lane Station, Philadelphia, Pa.

ROLLED FIRELESS STERLING SILVER
SILVER SOLDERS, ANODE SILVER and SILVER WIRE
For further information address
JOHN J. JACKSON CO.
91 Mechanic St. NEWARK, N. J.

DIRECTORY

MANUFACTURERS OF PLATED SHEET METALS

NATIONAL SHEET METAL CO.
Manufacturers of **PLATED SHEET METALS**
Nickelzinc, Brasszinc, Copperzinc, Bronzezinc, Nickeltin, Brasstin, Coppertin, Bronzetin
Sheet Zinc, polished and unpolished, for stamping
LARGE SAVING TO MANUFACTURERS LAST YEAR'S SALES 1,000,000 LBS.
For Further Information Address **Office: PERU, ILLINOIS**

ELECTROPLATED STEEL STRIPS

Steel and Zinc Sheets in Nickel, Brass, Copper or Tombac finish, manufactured by

HILLE & MÜLLER

The Largest Works of the World in this line of manufacture — DÜSSELDORF, GERMANY

ST. JOSEPH LEAD COMPANY

Pig Lead

5 Nassau St., New York

Horsehead Spelter

The Original Brand of Pure Spelter

Indispensable in the manufacture of

Cartridge Metal, German Silver, Fine Spun Work, Fine Castings, Superior Alloys, &c.

THE NEW JERSEY ZINC CO.

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55 Wall Street, New York

ILLINOIS ZINC COMPANY

Manufacturers of

Spelter, Sheet Zinc, and Sulphuric Acid

PERU, ILL.

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Telephone, 139 Beekman

High Grade Spelter

GOLDEN ROD BRAND

Suitable for High Grade Brass Work, Cartridge Metal, Etc.

Brazing Solder

H. M. Shimer & Co.

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Manufacturers of

HIGH GRADE SPELTER

SUITABLE FOR ALL PURPOSES

General Offices:

120 N. Peoria Street, Chicago, Ills.

Works: Sandoval, Ills.

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LA SALLE, ILLINOIS

Smelters of Spelter

AND MANUFACTURERS OF

Sheet Zinc and Sulphuric Acid

Zincs for Leclanche Battery

Special sizes of Zinc to order. Rolled Battery Plates. Selected Plates for Etchers' and Lithographers' use. Selected Sheets for Paper and Card Makers' use. Stove and Washboard Blanks.

High-Grade Spelter and Sulphuric Acid

HEGELER BROTHERS, DANVILLE, ILL.

Cold Rolled Zinc

IN COILS FOR

Drawing and Stamping

THE PLATT BROS. & CO.

WATERBURY, CT.

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FOR SALE

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